

Figure 1-A

Composition analysis of cupric silicate (synthesized at acidic reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % Element

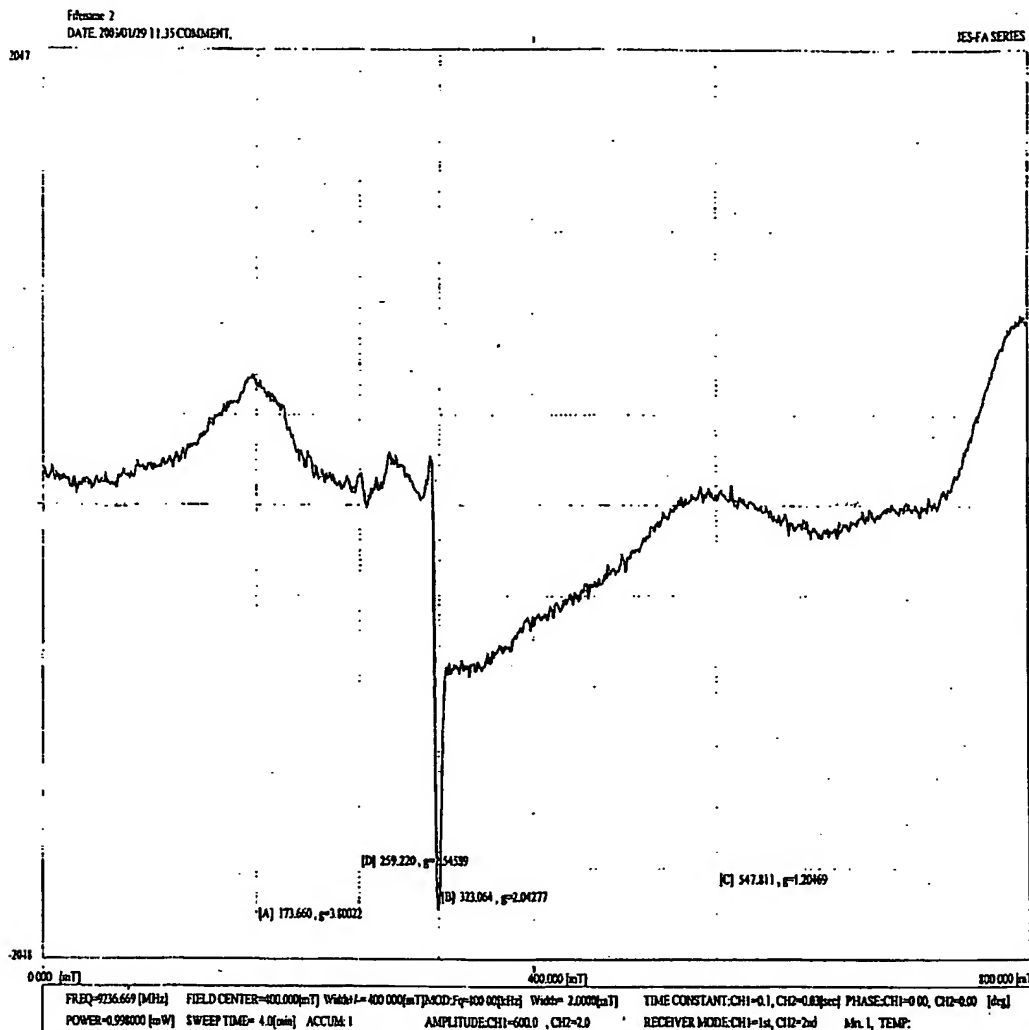
| Filename | o k | NaK | Sik | ClK | CuK |
|----------|-------|------|------|-------|-------|
| II.spc | 45.39 | 1.74 | 6.33 | 13.92 | 32.63 |

Atomic % Element

| Filename | o k | NaK | Sik | ClK | CuK |
|----------|-------|------|------|------|-------|
| II.spc | 70.15 | 1.87 | 5.57 | 9.71 | 12.70 |

Figure 1-B

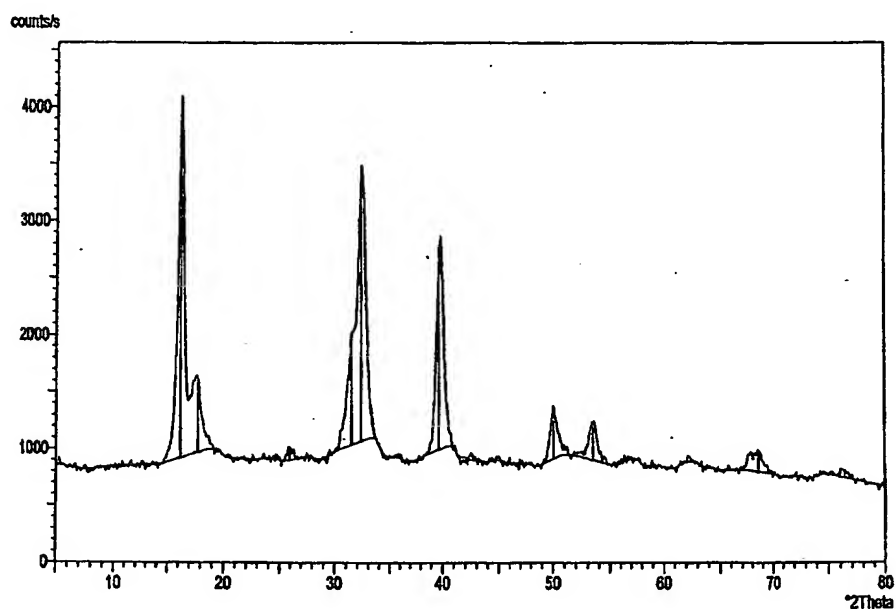
ESR (Electron spin resonance) spectrometer analysis of cupric silicate (synthesized at acidic reaction conditions).



XRD (X-ray diffraction) pattern of cupric silicate (synthesized at acidic reaction conditions).

X'Pert Graphics & Identify
Graph: 2-R

User-1
1/25/03 14:37



Philips Analytical

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at acidic reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: 2-R 2

User-1
1/25/03 14:38

Original scan: 2-R
Description of scan:

Date: 1/24/03 14:25

Used wavelength: K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio: 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set: As Measured Intensities
Set created: 1/8/03 13:03
Peak positions defined by: Minimum of 2nd derivative
Minimum peak tip width (°2Theta): 0.00
Minimum peak tip width (°2Theta): 1.00
Peak base width (°2Theta): 2.00
Minimum significance: 0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 5.48673 | 100.00 | 16.14080 | 3156.22 | 923.90 | 0.44000 | 19.72 |
| 5.00327 | 20.71 | 17.71241 | 653.63 | 972.81 | 0.64000 | 4.14 |
| 3.43222 | 3.34 | 25.93831 | 105.37 | 906.45 | 0.48000 | 1.22 |
| 2.84108 | 30.80 | 31.46211 | 972.17 | 1038.43 | 0.20000 | 0.64 |
| 2.77130 | 75.78 | 32.27368 | 2391.87 | 1069.38 | 0.28000 | 2.91 |
| 2.27354 | 54.06 | 39.60778 | 1706.22 | 998.03 | 0.40000 | 7.76 |
| 1.82288 | 14.67 | 49.99281 | 463.03 | 916.51 | 0.20000 | 0.77 |
| 1.71366 | 10.53 | 53.42238 | 332.20 | 906.86 | 0.48000 | 1.89 |
| 1.36697 | 5.89 | 68.59240 | 185.87 | 802.15 | 0.48000 | 0.84 |
| 1.24612 | 1.96 | 76.36139 | 61.84 | 747.02 | 0.96000 | 0.83 |

WO 2004/101435

Figure 2-A

App No.: NEW

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)
NEW SHEET

Docket No.: 2761-0173PUS1

Sheet 5 of 56

B2003/002011

Composition analysis of cupric silicate (synthesized at acidic reaction conditions and at high temperature 70⁰ C to 90⁰ C) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % by Element

| Filename | o k | NaK | SiK | ClK | CuK |
|-----------|-------|------|-------|------|-------|
| c-nat.spc | 45.84 | 0.89 | 27.31 | 4.63 | 21.33 |

Atomic % Element

| Filename | o k | NaK | SiK | ClK | CuK |
|-----------|-------|------|-------|------|------|
| c-nat.spc | 65.98 | 0.89 | 22.39 | 3.01 | 7.73 |

WO 2004/101435

Figure 2-B

App No.: NEW

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

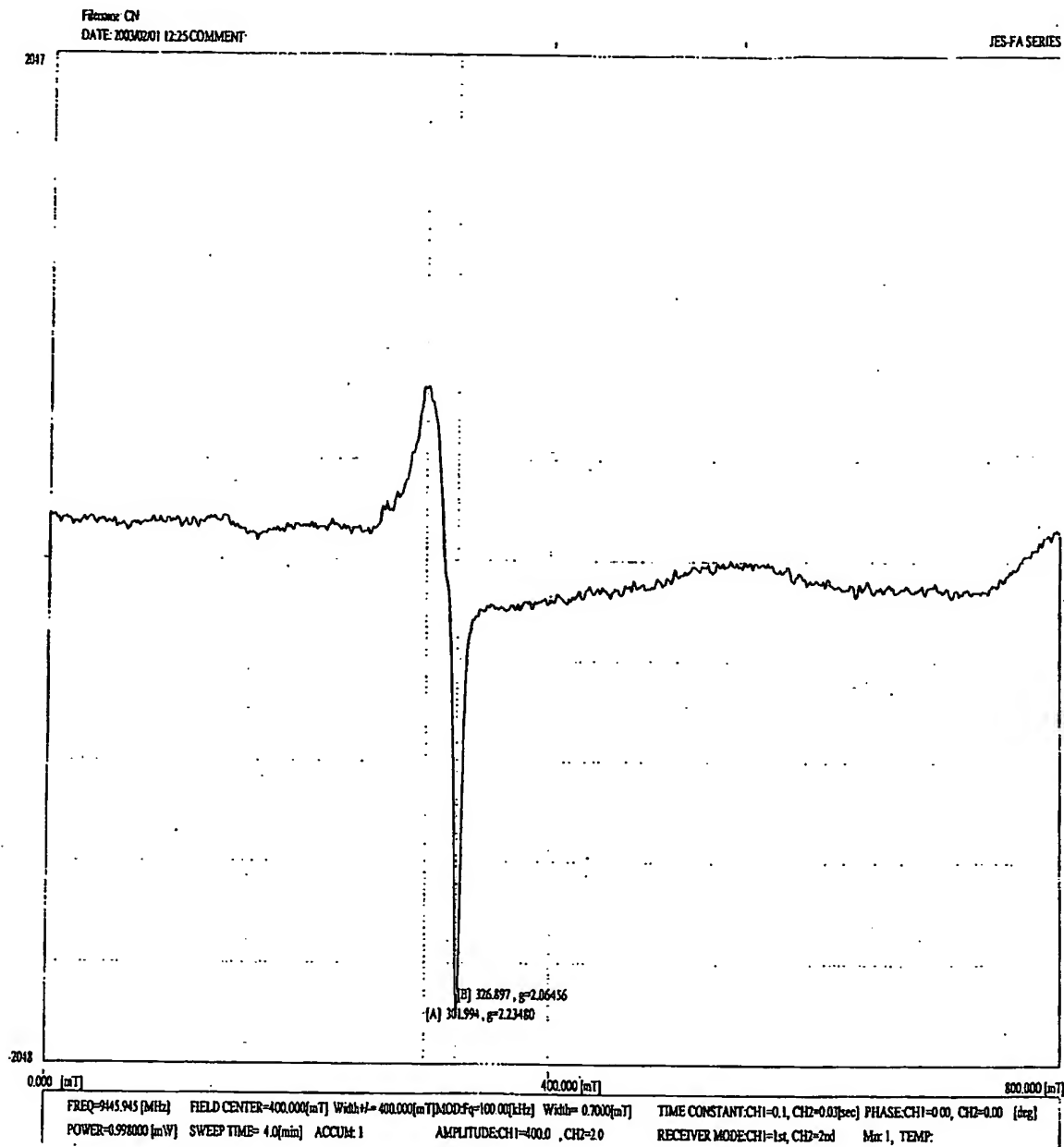
NEW SHEET

Docket No.: 2761-0173PUS1

Sheet 6 of 56

B2003/002011

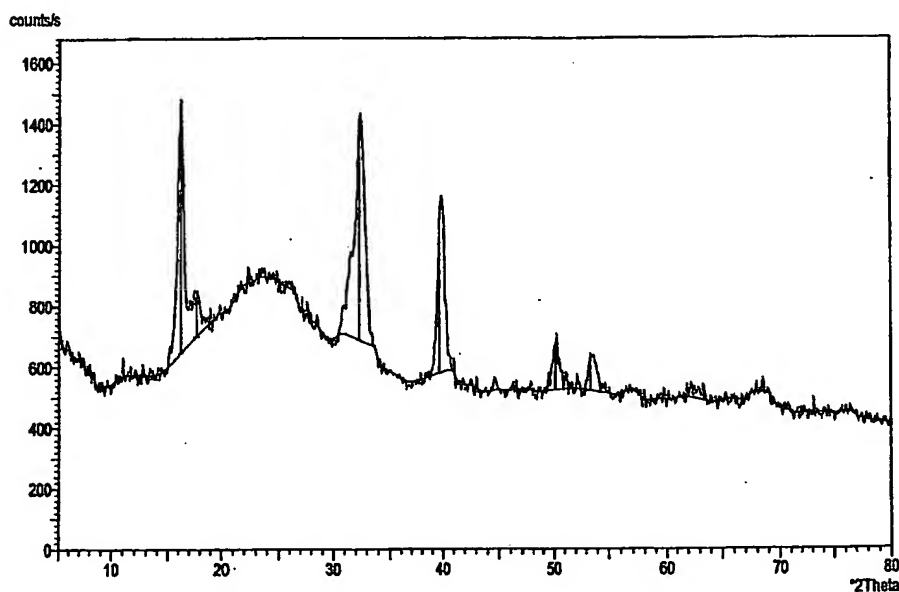
ESR (Electron spin resonance) spectrometer analysis of cupric silicate (synthesized at acidic reaction conditions and at higher temperature 70⁰ C to 90⁰ C).



XRD (X-ray diffraction) pattern of cupric silicate (synthesized at acidic reaction conditions and at higher temperature 70⁰ C to 90⁰ C).

XPert Graphics & Identify
Graph: CN-R

User-1
2/3/03 11:54



Philips Analytical

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at acidic reaction conditions and at higher temperature 70⁰ C to 90⁰ C).

X'Pert Graphics & Identify
(searched) peak list: CN-R 2

User-1
2/3/03 11:54

Original scan: CN-R
Description of scan:

Date: 2/2/03 16:09

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio: 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 5.46662 | 100.00 | 16.20057 | 835.63 | 647.06 | 0.40000 | 5.94 |
| 5.01048 | 15.55 | 17.68674 | 129.92 | 702.61 | 0.64000 | 0.71 |
| 2.77436 | 84.58 | 32.23910 | 706.74 | 690.34 | 0.40000 | 3.61 |
| 2.27554 | 60.14 | 39.57159 | 502.52 | 580.44 | 0.56000 | 8.46 |
| 1.82094 | 18.29 | 50.04991 | 152.83 | 524.53 | 0.40000 | 0.90 |
| 1.71674 | 13.71 | 53.31888 | 114.53 | 522.91 | 0.40000 | 0.62 |
| 1.46762 | 5.69 | 63.31614 | 47.53 | 489.95 | 0.28000 | 0.60 |

WO 2004/101435

App No.: NEW

Docket No.: 2761-0173PUS1

Inventor: Yandapalli Durga PRASAD

B2003/002011

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

Figure 3-A:

NEW SHEET

Sheet 9 of 56

Composition analysis of cupric silicate (synthesized at neutral (pH 6-7) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

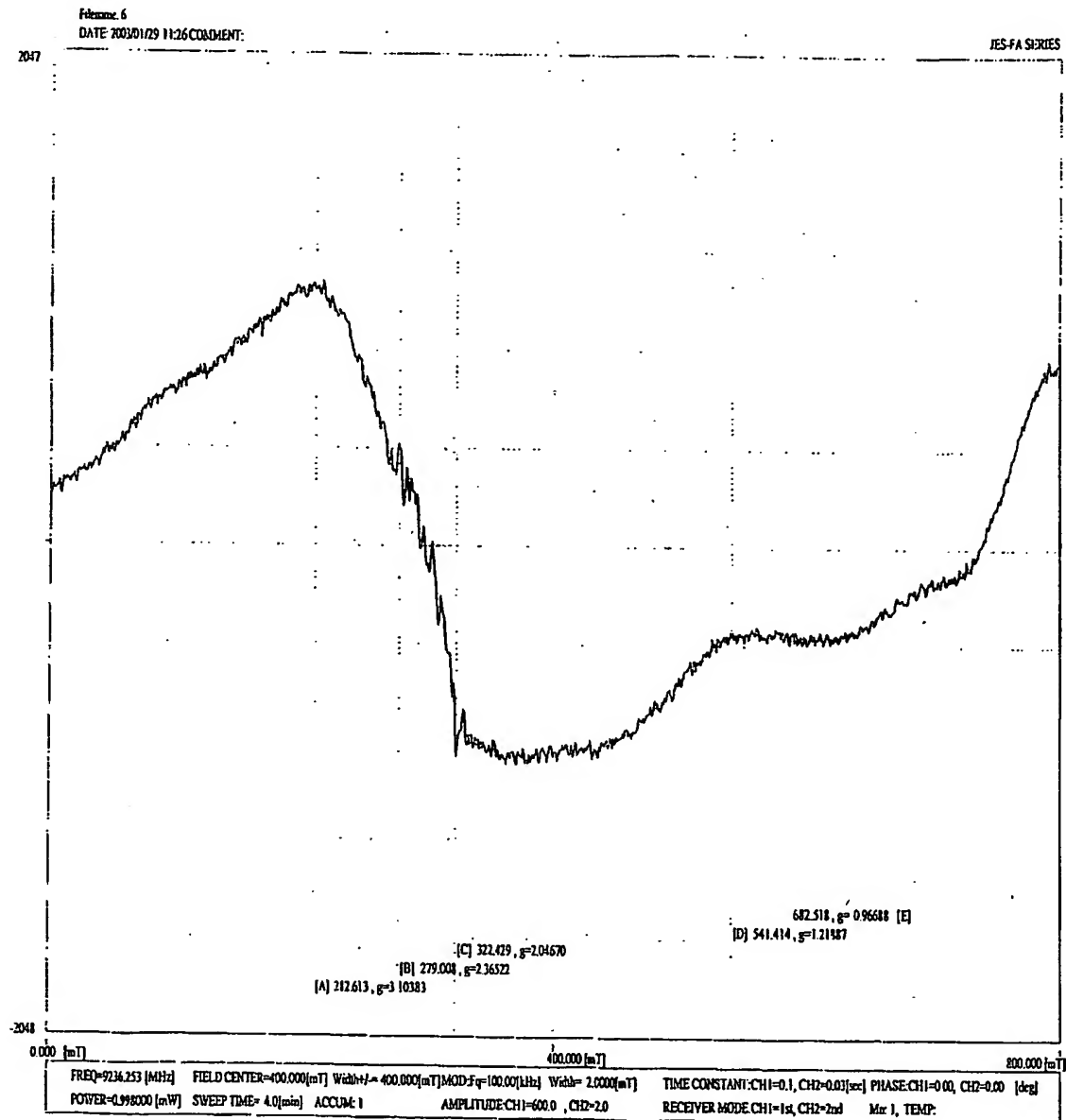
Weight % by Element

| Filename | o k | NaK | Sik | ClK | CuK |
|----------|-------|------|-------|------|-------|
| VI.spc | 49.47 | 1.06 | 22.59 | 4.27 | 22.62 |

Atomic % by Element

| Filename | o k | NaK | Sik | ClK | CuK |
|----------|-------|------|-------|------|------|
| VI.spc | 69.98 | 1.04 | 18.20 | 2.73 | 8.06 |

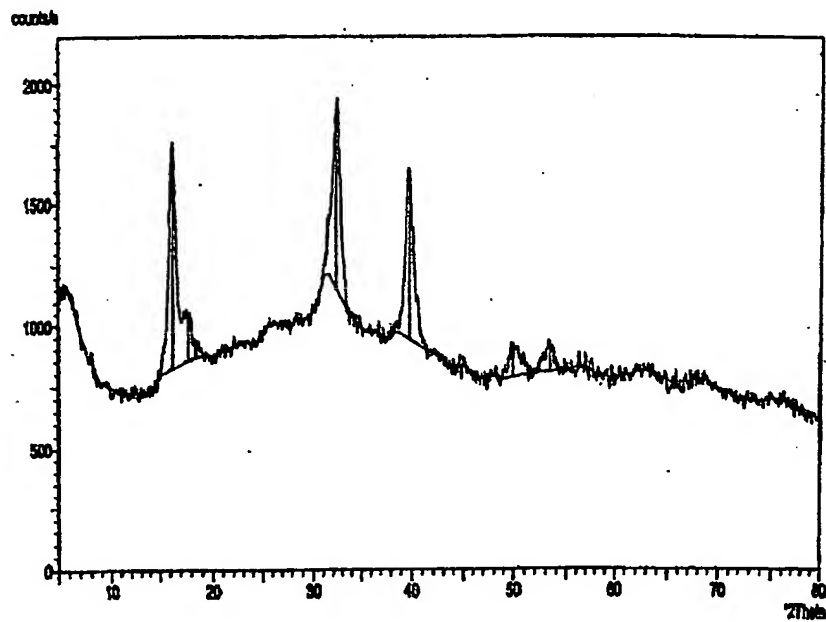
ESR (Electron spin resonance) spectrometer analysis of cupric silicate (synthesized at neutral (pH 6-7) reaction conditions).



XRD (X-ray diffraction) pattern of cupric silicate (synthesized at neutral (pH 6-7) reaction conditions).

XPert Graphics & Identify
Graph: 6-R

User: 1
1/23/03 14:48



Philips Analytical

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at neutral (pH 6-7) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: 6-R 2

User-1
1/25/03 14:41

Original scan: 6-R
Description of scan:

Date: 1/25/03 11:54

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio: 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 5.46823 | 100.00 | 16.19577 | 940.90 | 822.33 | 0.44000 | 5.24 |
| 4.99966 | 19.39 | 17.72532 | 182.41 | 834.59 | 0.64000 | 0.74 |
| 2.76987 | 81.24 | 32.29276 | 764.43 | 1159.63 | 0.36000 | 2.79 |
| 2.26420 | 73.85 | 39.77809 | 694.85 | 945.62 | 0.36000 | 2.83 |
| 1.82157 | 14.47 | 50.03142 | 136.11 | 789.55 | 0.48000 | 0.76 |
| 1.71307 | 10.80 | 53.44225 | 101.61 | 812.60 | 0.80000 | 1.14 |

WO 2004/101435

App No.: NEW

Docket No.: 2761-0173PUS1

B2003/002011

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Sheet 13 of 56

Figure 4-A:

Composition analysis of cupric silicate (synthesized at basic (pH 10-11) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % by Element

| FileNames | o k | NaK | Sik | CuK |
|-----------|-------|------|-------|-------|
| VII.spc | 54.33 | 0.44 | 24.65 | 20.58 |

Atomic % by Element

| FileNames | o k | NaK | Sik | CuK |
|-----------|-------|------|-------|------|
| VII.spc | 73.56 | 0.41 | 19.01 | 7.02 |

ESR (Electron spin resonance) spectrometer analysis of cupric silicate (synthesized at basic (pH 10-11) reaction conditions).

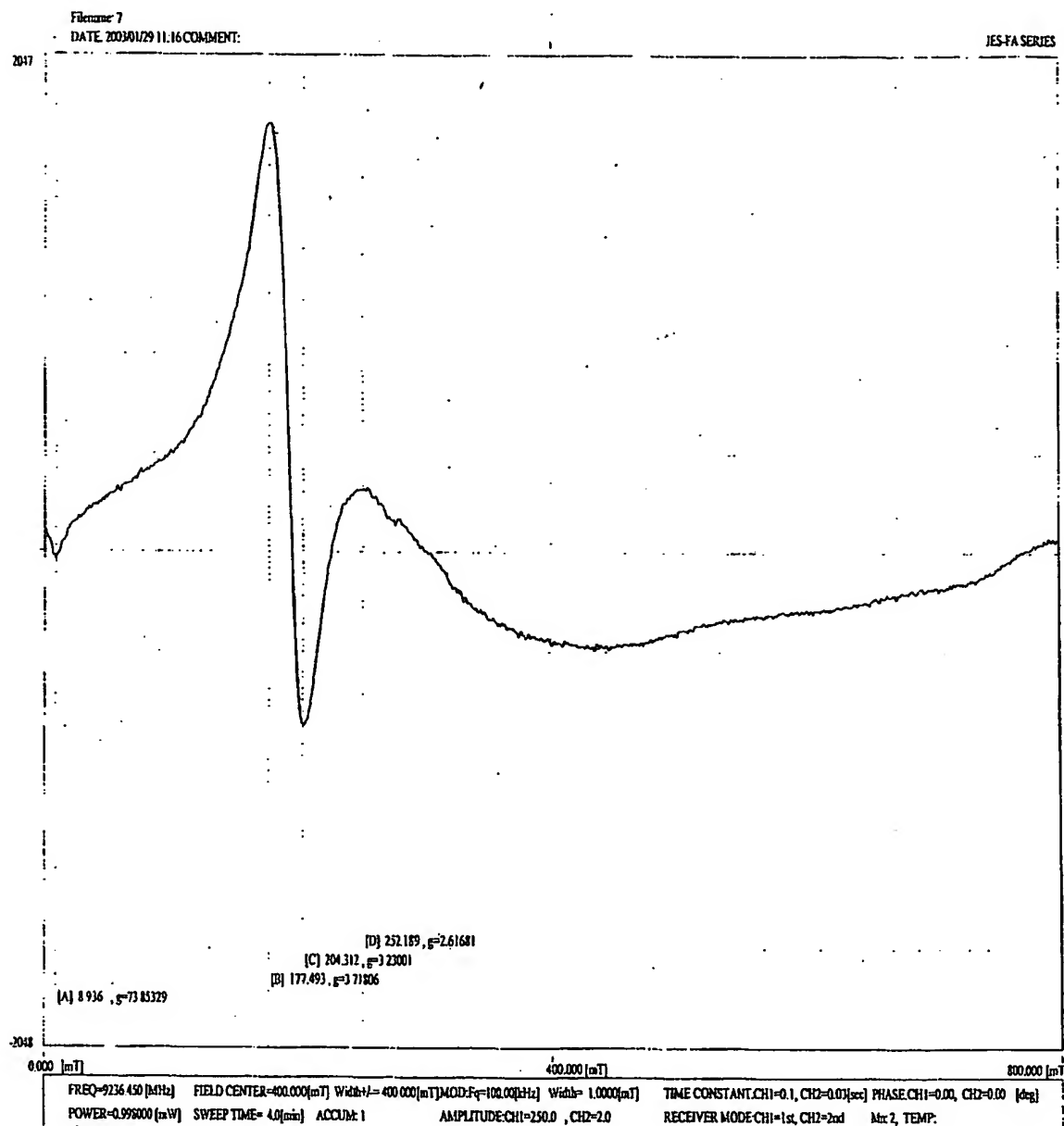
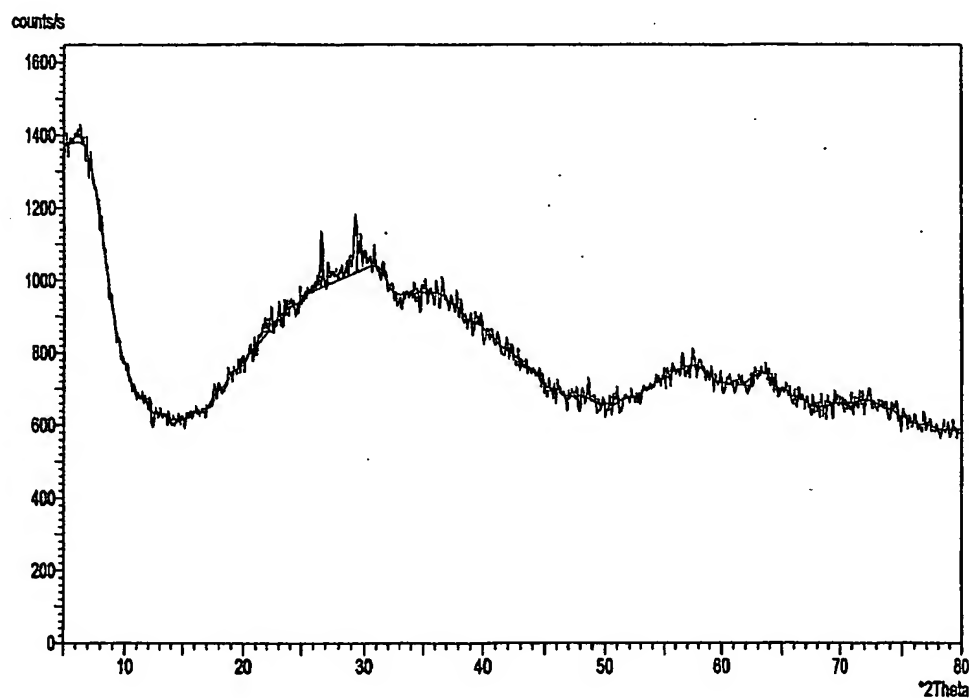


Figure 4-C

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at basic (pH 10-11) reaction conditions).

X'Pert Graphics & Identify
Graph: 7-R

User-1
1/25/03 14:42



Philips Analytical

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at basic (pH 10-11) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: 7-R 2

User-1
1/25/03 14:42

Original scan: 7-R
Description of scan:

Date: 1/25/03 12:44

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å): 1.54056

K-Alpha2 wavelength (Å): 1.54439

K-Alpha2/K-Alpha1 intensity ratio: 0.50000

K-Alpha wavelength (Å): 1.54056

K-Beta wavelength (Å): 1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 4.01966 | 16.81 | 22.09561 | 25.68 | 860.24 | 0.96000 | 0.66 |
| 3.34217 | 100.00 | 26.64983 | 152.74 | 982.28 | 0.20000 | 0.78 |
| 3.03278 | 66.38 | 29.42686 | 101.40 | 1024.95 | 0.48000 | 0.63 |

WO 2004/101435

Figure 5-A:

App No.: NEW

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Docket No.: 2761-0173PUS1

Sheet 17 of 56

B2003/002011

Composition analysis of cupric silicate (synthesized at extreme acidic reaction conditions (below pH 2) by addition of 10 ml HCl) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % by Element

| Filenames | o k | NaK | SiK | ClK | CuK |
|-----------|-------|------|-------|------|-------|
| c10.spc | 45.69 | 1.06 | 32.63 | 3.30 | 17.33 |

Atomic % by Element

| Filenames | o k | NaK | SiK | ClK | CuK |
|-----------|-------|------|-------|------|------|
| c10.spc | 64.47 | 1.04 | 26.23 | 2.10 | 6.16 |

ESR (Electron spin resonance) spectrometer analysis of cupric silicate (synthesized at extreme acidic reaction conditions (below pH 2) by addition of 10 ml HCl).

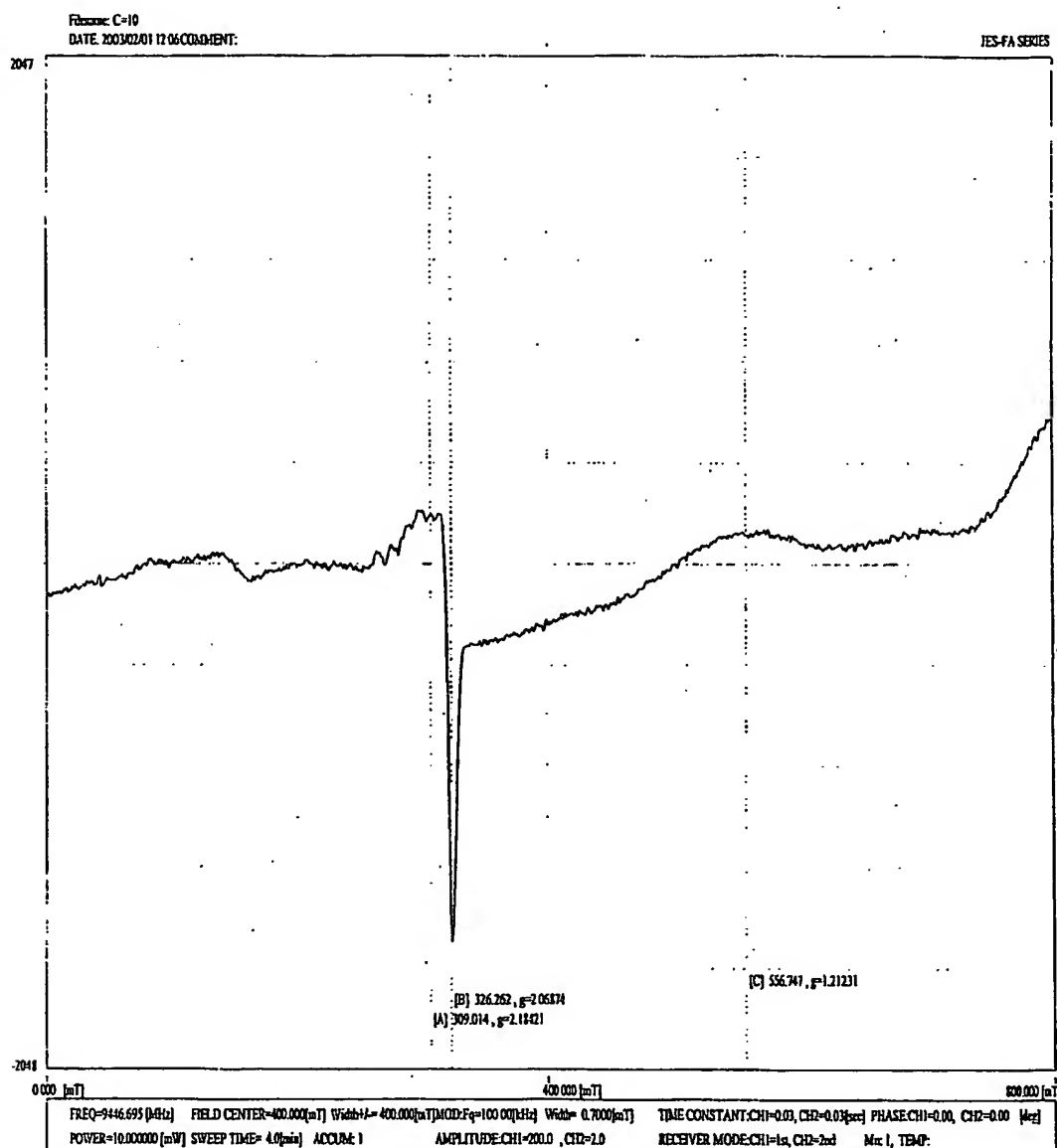
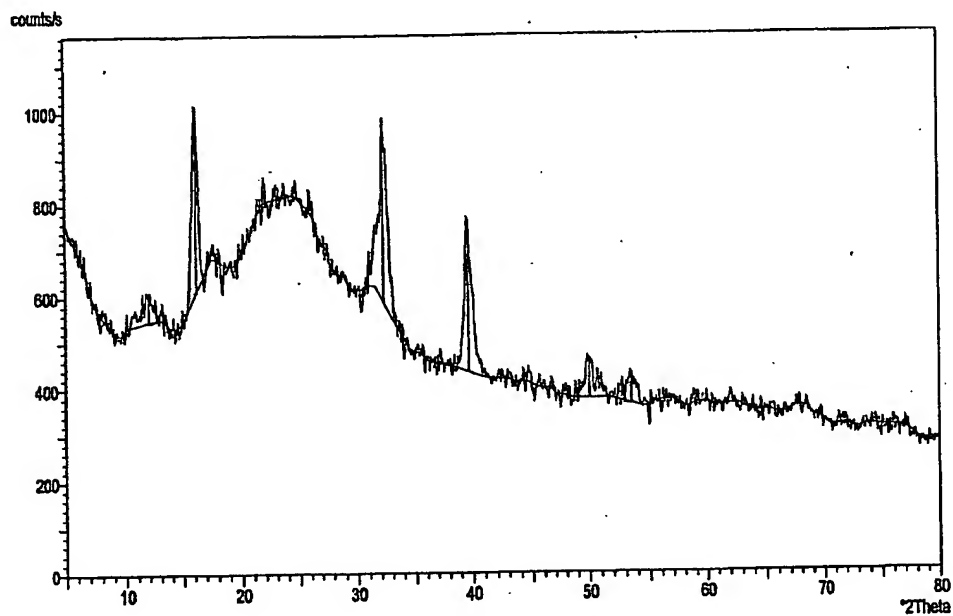


Figure 5-C

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at extreme acidic reaction conditions (below pH 2) by addition of 10 ml HCl).

XPert Graphics & Identify
Graph: C10-R

User-1
2/3/03 11:56



Philips Analytical

WO 2004/101435

Figure 5-C

App No.: NEW
 Inventor: Yandapalli Durga PRASAD
 Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)
 NEW SHEET

Docket No.: 2761-0173PUS1

B2003/002011

Sheet 20 of 56

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at extreme acidic reaction conditions (below pH 2) by addition of 10 ml HCl).

X'Pert Graphics & Identify
 (searched) peak list: C10-R 2

User-1
 2/3/03 11:56

Original scan: C10-R
 Description of scan:

Date: 2/2/03 15:13

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å):
 K-Alpha2 wavelength (Å):
 K-Alpha2/K-Alpha1 intensity ratio:
 K-Alpha wavelength (Å):
 K-Beta wavelength (Å):

1.54056
 1.54439
 0.50000
 1.54056
 1.39222

Peak search parameter set:

As Measured Intensities
 1/8/03 13:03
 Minimum of 2nd derivative

Set created:
 Peak positions defined by:
 Minimum peak tip width (°2Theta):
 Minimum peak tip width (°2Theta):
 Peak base width (°2Theta):
 Minimum significance:

0.00
 1.00
 2.00
 0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 7.39149 | 15.98 | 11.96350 | 64.02 | 545.13 | 0.80000 | 0.73 |
| 5.46724 | 100.00 | 16.19872 | 400.70 | 610.14 | 0.32000 | 2.15 |
| 2.77097 | 98.52 | 32.27956 | 394.77 | 587.64 | 0.20000 | 0.79 |
| 2.26751 | 82.36 | 39.71761 | 330.02 | 436.05 | 0.28000 | 1.67 |
| 1.82010 | 20.70 | 50.07447 | 82.93 | 377.75 | 0.48000 | 0.98 |
| 1.71117 | 15.69 | 53.30644 | 62.86 | 365.08 | 0.80000 | 0.92 |

Philips Analytical

Page: 1

App No.: NEW

Docket No.: 2761-0173PUS1

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Sheet 21 of 56

WO 2004/101435

PCT/IB2003/002011

Figure 6-A:

Composition analysis of cupric silicate (synthesized at extreme acidic reaction conditions (below pH 2) by addition of 20 ml HCl) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % by Element

| Filename | o k | NaK | SiK | ClK | CuK |
|----------|-------|------|-------|------|-------|
| c20.spc | 52.91 | 0.60 | 33.23 | 1.92 | 11.34 |

Atomic % by Element

| Filename | o k | NaK | SiK | ClK | CuK |
|----------|-------|------|-------|------|------|
| c20.spc | 69.64 | 0.55 | 24.91 | 1.14 | 3.76 |

Figure 6-B

ESR (Electron spin resonance) spectrometer analysis of cupric silicate (synthesized at extreme acidic reaction conditions (below pH 2) by addition of 20 ml HCl).

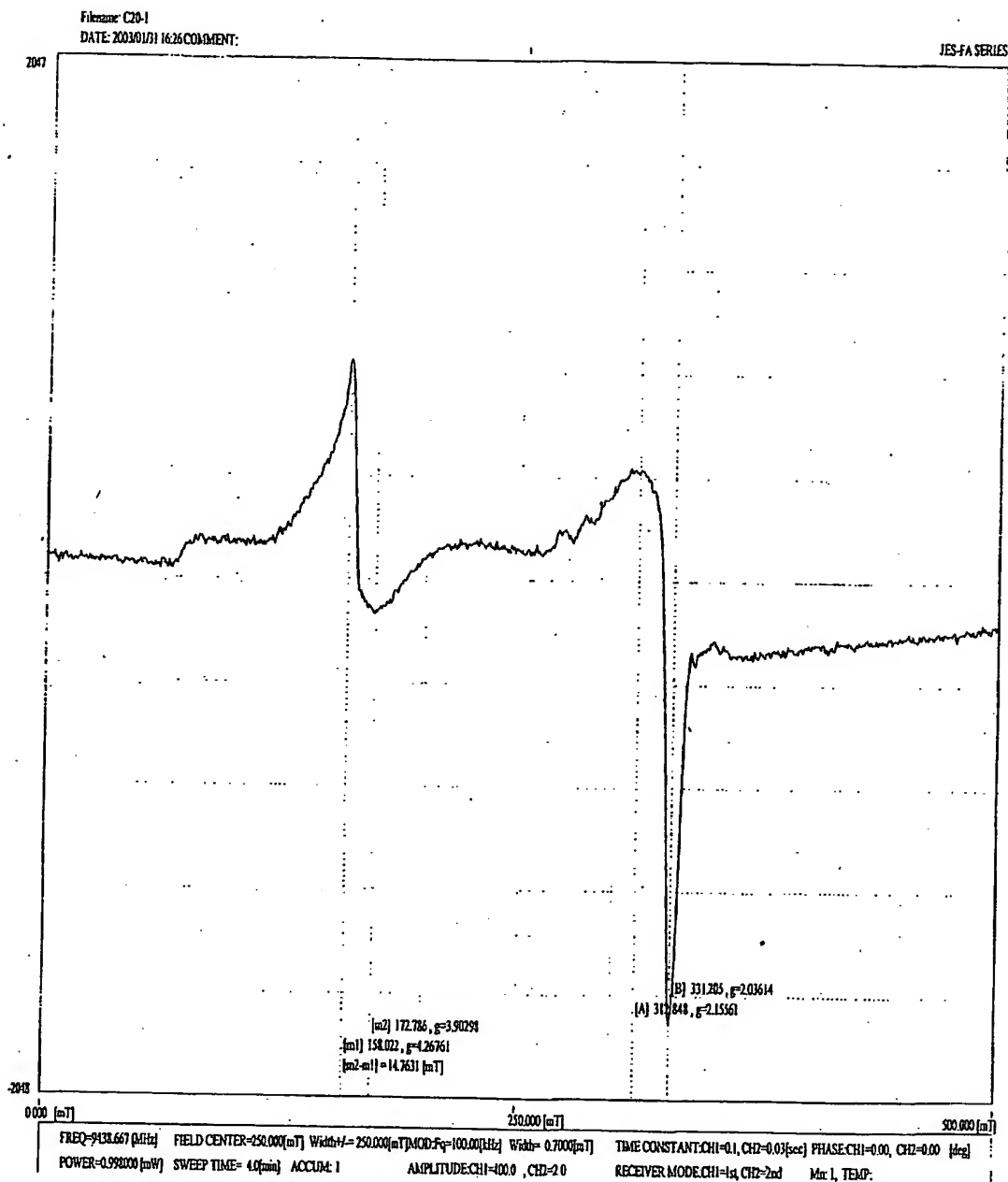
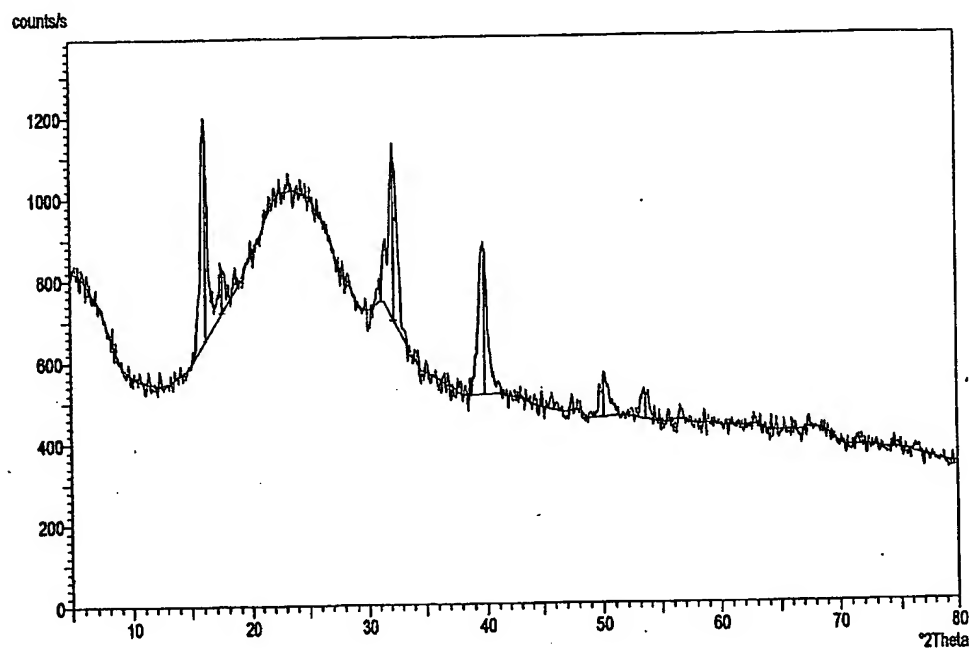


Figure 6-C

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at extreme acidic reaction conditions: (below pH 2) by addition of 20 ml HCl).

XPert Graphics & Identify
Graph: C20-R

User-1
2/3/03 11:57



Philips Analytical

XRD (X-ray diffraction) pattern of cupric silicate (synthesized at extreme acidic reaction conditions (below pH:2) by addition of 20 ml HCl).

X'Pert Graphics & Identify
(searched) peak list: C20-R 2

User-1
2/3/03 11:57

Original scan: C20-R
Description of scan:

Date: 2/2/03 14:43

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å):
K-Alpha2 wavelength (Å):
K-Alpha2/K-Alpha1 intensity ratio :
K-Alpha wavelength (Å):
K-Beta wavelength (Å):

1.54056
1.54439
0.50000
1.54056
1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 5.44576 | 100.00 | 16.26305 | 541.23 | 653.67 | 0.20000 | 0.71 |
| 5.03216 | 19.73 | 17.60991 | 106.76 | 721.64 | 0.48000 | 0.77 |
| 2.76378 | 76.53 | 32.36589 | 414.21 | 698.97 | 0.56000 | 3.99 |
| 2.26021 | 67.52 | 39.85131 | 365.45 | 515.17 | 0.56000 | 4.06 |
| 2.01957 | 7.07 | 44.84173 | 38.28 | 483.78 | 0.24000 | 0.70 |
| 1.82106 | 15.18 | 50.04628 | 82.15 | 457.19 | 0.64000 | 0.84 |
| 1.71148 | 11.43 | 53.49579 | 61.84 | 451.40 | 0.80000 | 1.24 |

Composition analysis* of zinc silicate (synthesized at neutral (pH 6-7) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % by Element

| FileNames | o k | Sik | ClK | ZnK |
|-----------|-------|------|------|-------|
| nine.spc | 35.71 | 4.89 | 0.08 | 59.32 |

Atomic % by Element

| FileNames | o k | Sik | ClK | ZnK |
|-----------|-------|------|------|-------|
| nine.spc | 67.32 | 5.25 | 0.06 | 27.37 |

ESR (Electron spin resonance) spectrometer analysis of zinc silicate (synthesized at neutral (pH 6-7) reaction conditions).

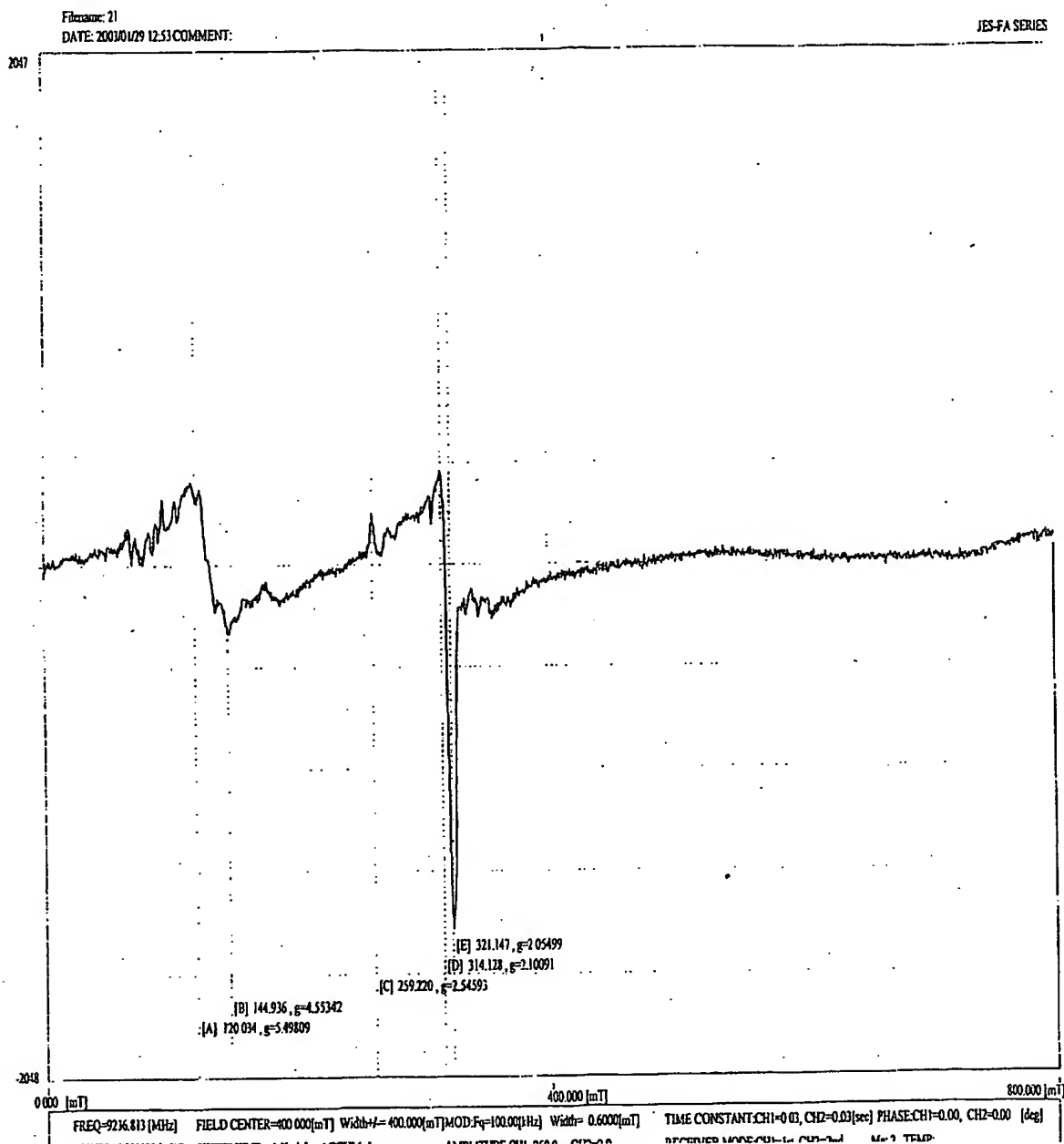
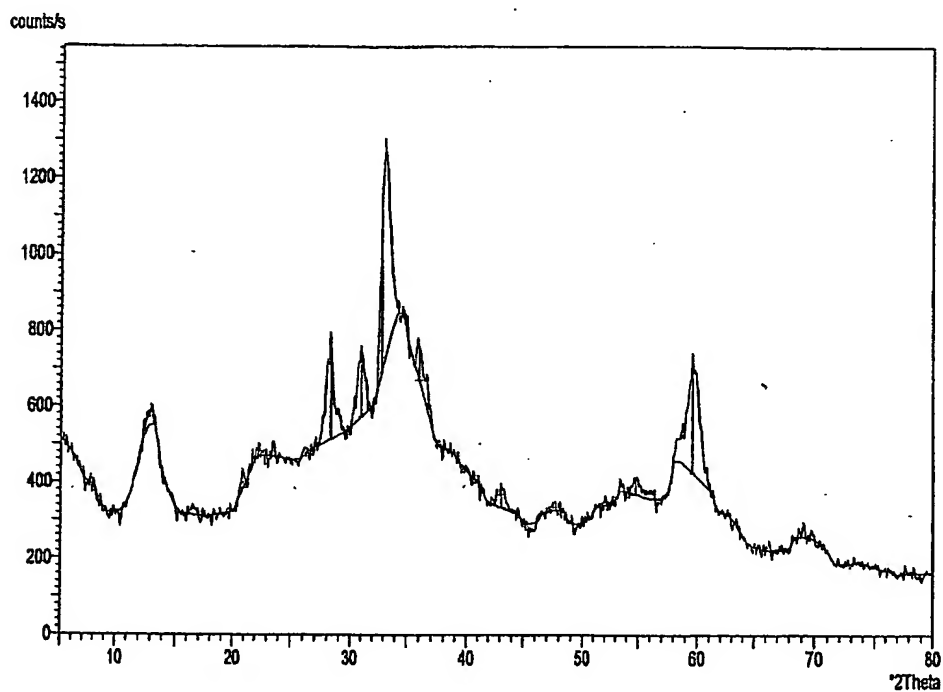


Figure 7-C

XRD (X-ray diffraction) pattern of zinc silicate (synthesized at neutral (pH 6-7) reaction conditions).

XPert Graphics & Identify
Graph: 21-R

User-1
1/25/03 14:38



Philips Analytical

XRD (X-ray diffraction) pattern of zinc silicate (synthesized at neutral (pH 6-7) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: 21-R 2

User-1
1/25/03 14:39

Original scan: 21-R
Description of scan:

Date: 1/25/03 13:25

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio: 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 4.24766 | 9.82 | 20.89591 | 43.60 | 386.64 | 0.48000 | 0.85 |
| 3.15351 | 59.30 | 28.27636 | 263.36 | 514.45 | 0.48000 | 1.66 |
| 2.88286 | 40.51 | 30.99464 | 179.93 | 574.24 | 0.40000 | 0.76 |
| 2.73150 | 100.00 | 32.75904 | 444.15 | 691.51 | 0.28000 | 0.83 |
| 2.49483 | 21.20 | 35.96794 | 94.17 | 671.04 | 0.64000 | 0.70 |
| 2.09711 | 13.25 | 43.09916 | 58.83 | 334.47 | 0.64000 | 0.73 |
| 1.67436 | 9.61 | 54.77999 | 42.67 | 370.46 | 0.64000 | 0.92 |
| 1.55031 | 69.13 | 59.58455 | 307.02 | 427.76 | 0.40000 | 0.84 |

WO 2004/101435

App No.: NEW

Docket No.: 2761-0173PUS1

Inventor: Yandapalli Durga PRASAD

B2003/002011

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Sheet 29 of 56

Figure 8-A:

Composition analysis of zinc silicate (synthesized at extreme acidic (below pH2) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % by Element

| FileNames | o k | ZnL | NaK | SiK | ClK |
|-------------|-------|-------|------|-------|------|
| zinc-10.spc | 35.59 | 41.94 | 0.00 | 17.04 | 5.43 |

Atomic % by Element

| FileNames | o k | ZnL | NaK | SiK | ClK |
|-------------|-------|-------|------|-------|------|
| zinc-10.spc | 61.35 | 17.69 | 0.00 | 16.73 | 4.22 |

ESR (Electron spin resonance) spectrometer analysis of zinc silicate (synthesized at extreme acidic (below pH2)-reaction conditions).

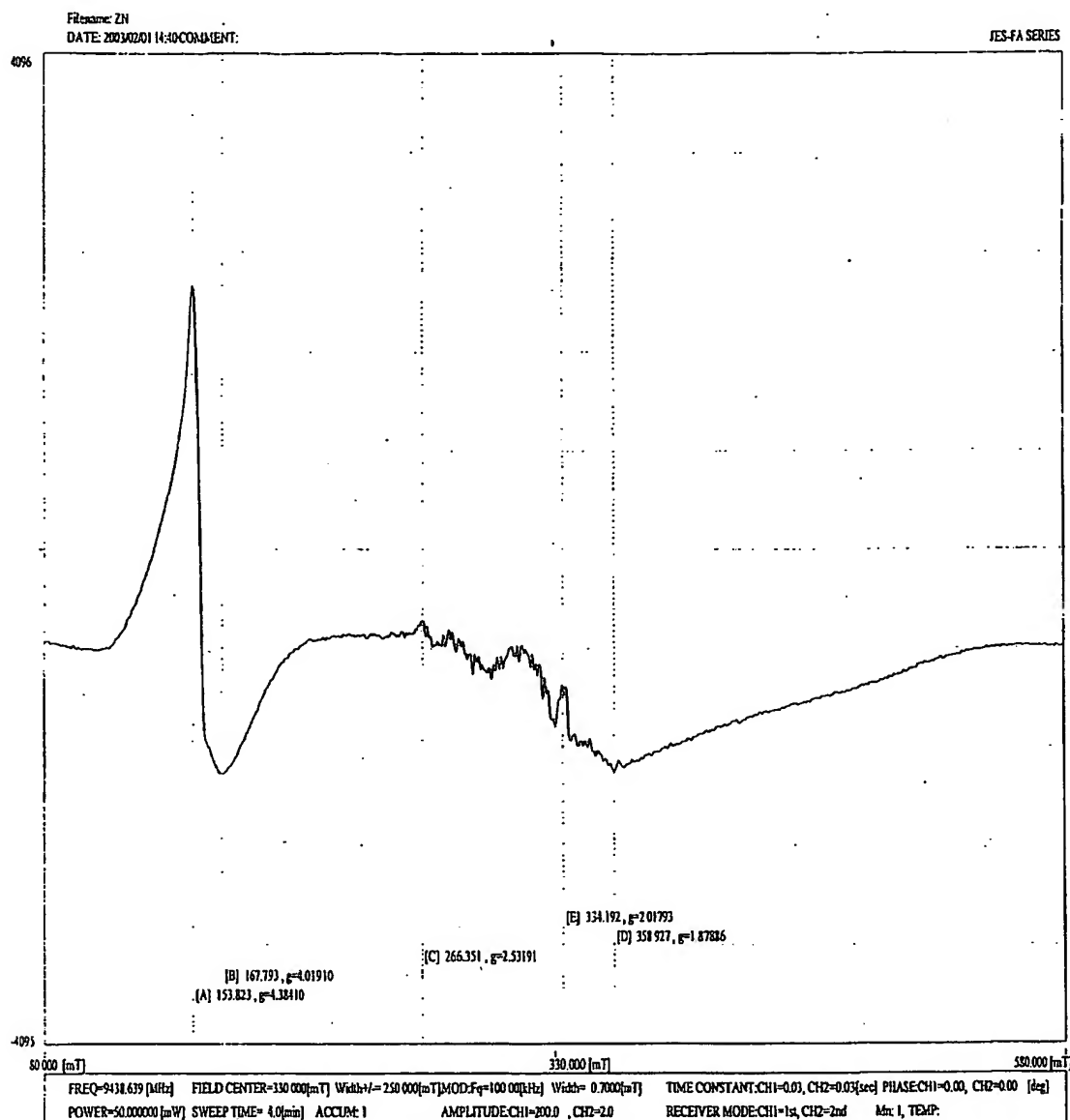


Figure 8-B

ESR (Electron spin resonance) spectrometer analysis of zinc silicate (synthesized at extreme acidic (below pH2) reaction conditions).

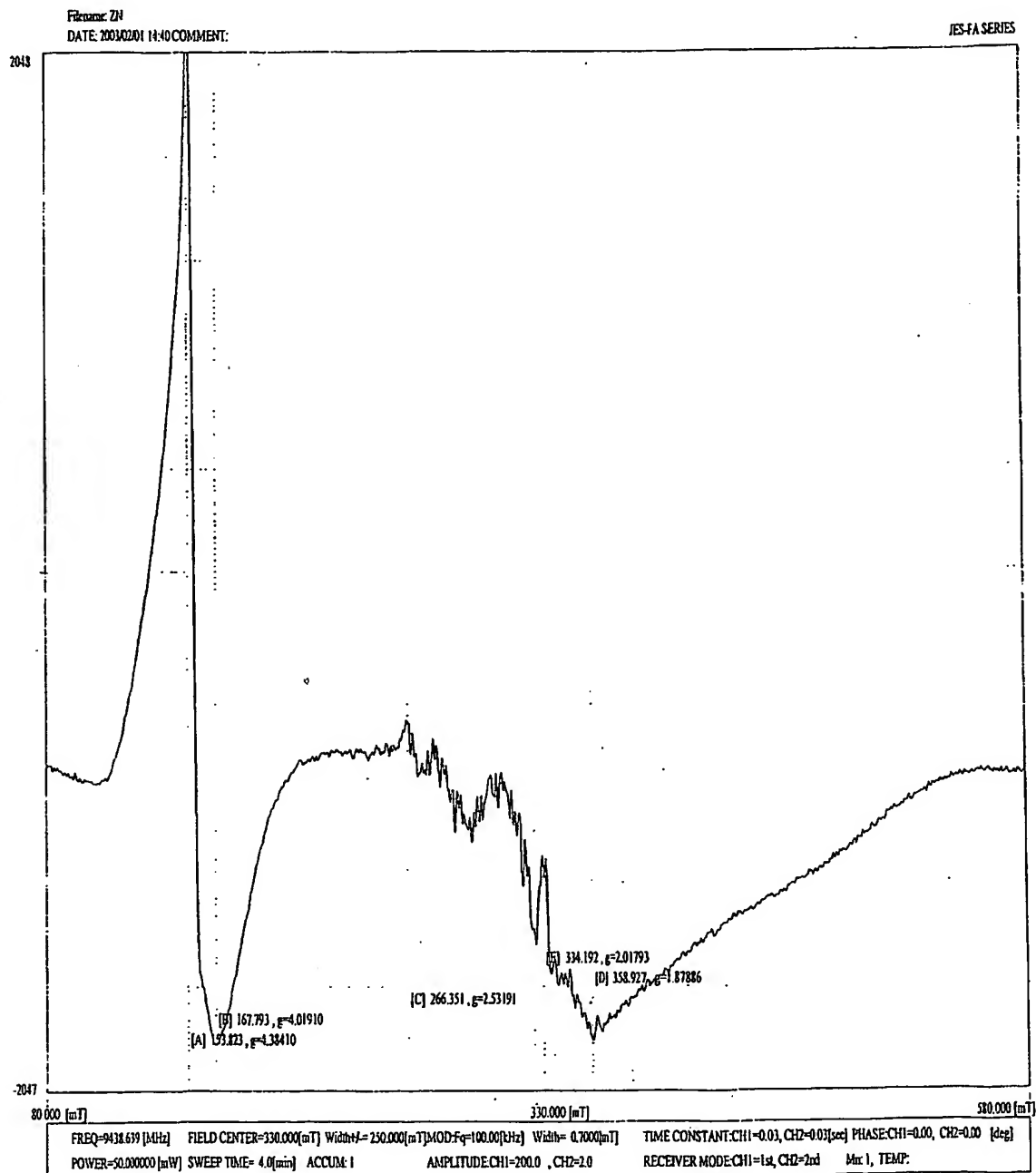
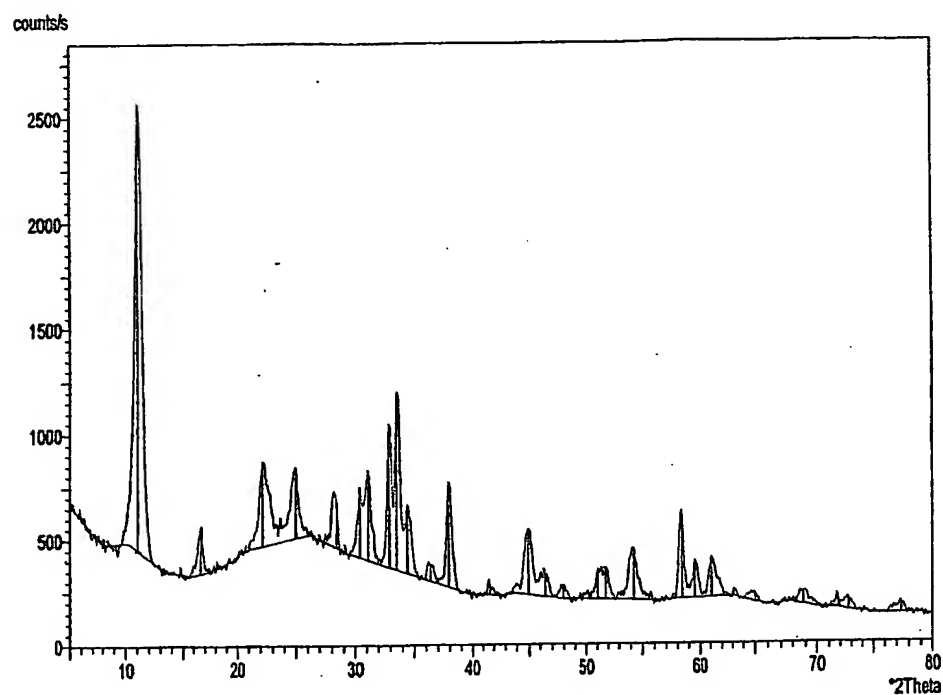


Figure 8-C

XRD (X-ray diffraction) pattern of zinc silicate (synthesized at extreme acidic (below pH2) reaction conditions).

X'Pert Graphics & Identify
Graph: XZ-R

User-1
2/3/03 11:58



Philips Analytical

Figure 8-C

XRD (X-ray diffraction) pattern of zinc silicate (synthesized at extreme acidic (below pH2) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: XZ-R 2

User-1
2/3/03 11:58

Original scan: XZ-R
Description of scan:

Date: 2/1/03 18:50

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å):

1.54056

K-Alpha2 wavelength (Å):

1.54439

K-Alpha2/K-Alpha1 intensity ratio:

0.50000

K-Alpha wavelength (Å):

1.54056

K-Beta wavelength (Å):

1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 7.98264 | 100.00 | 11.07467 | 2079.88 | 453.30 | 0.48000 | 16.11 |
| 5.33677 | 10.63 | 16.59748 | 221.17 | 343.67 | 0.32000 | 1.31 |
| 4.00484 | 19.52 | 22.17845 | 406.04 | 474.57 | 0.28000 | 0.97 |
| 3.56647 | 16.16 | 24.94587 | 336.14 | 510.88 | 0.24000 | 1.03 |
| 3.14366 | 10.46 | 28.36683 | 217.55 | 465.82 | 0.48000 | 4.95 |
| 2.93766 | 15.03 | 30.40232 | 312.67 | 418.68 | 0.24000 | 1.39 |
| 2.86706 | 20.14 | 31.16978 | 418.81 | 403.81 | 0.32000 | 2.08 |
| 2.72163 | 31.97 | 32.88120 | 664.98 | 370.63 | 0.32000 | 4.93 |
| 2.67080 | 40.17 | 33.52527 | 835.44 | 358.14 | 0.36000 | 7.23 |
| 2.60200 | 15.53 | 34.43904 | 322.95 | 340.43 | 0.24000 | 0.93 |
| 2.46786 | 3.83 | 36.37469 | 79.68 | 303.54 | 0.32000 | 1.82 |
| 2.37176 | 23.66 | 37.90343 | 492.02 | 275.31 | 0.36000 | 4.69 |
| 2.16675 | 2.30 | 41.64812 | 47.90 | 237.27 | 0.48000 | 0.80 |
| 2.01036 | 14.86 | 44.91711 | 308.99 | 237.75 | 0.64000 | 5.99 |
| 1.95400 | 4.79 | 46.43299 | 99.53 | 226.89 | 0.72000 | 2.14 |
| 1.89620 | 2.90 | 47.93553 | 60.26 | 216.13 | 0.64000 | 1.07 |
| 1.78961 | 6.59 | 50.98829 | 136.97 | 214.24 | 0.40000 | 0.92 |
| 1.76470 | 6.90 | 51.76088 | 143.48 | 213.02 | 0.32000 | 0.65 |
| 1.68726 | 11.52 | 54.32631 | 239.59 | 208.98 | 0.32000 | 1.25 |
| 1.57830 | 19.87 | 58.42442 | 413.19 | 213.32 | 0.40000 | 6.07 |
| 1.55167 | 7.86 | 59.52677 | 163.47 | 215.82 | 0.24000 | 0.83 |
| 1.51355 | 8.99 | 61.09471 | 186.93 | 219.37 | 0.32000 | 1.26 |
| 1.43353 | 1.90 | 65.00406 | 39.44 | 193.08 | 0.56000 | 0.61 |
| 1.36374 | 2.96 | 68.78101 | 61.53 | 182.93 | 0.64000 | 0.99 |
| 1.29976 | 2.39 | 72.68780 | 49.61 | 155.06 | 0.64000 | 0.68 |
| 1.23245 | 2.46 | 77.36409 | 51.16 | 187.24 | 0.48000 | 0.76 |

WO 2004/101435

Figure 9-A:

App No.: NEW

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Docket No.: 2761-0173PUS1

Sheet 34 of 56

B2003/002011

Composition analysis of silver silicate (synthesized at neutral (pH 6-7) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

Weight % by Element

| Filenames | o k | NaK | Sik | ClK | AgL |
|-------------|-------|------|------|-------|-------|
| Silver5.spc | 29.55 | 0.56 | 2.63 | 15.79 | 51.47 |

Atomic % by Element

| Filenames | o k | NaK | Sik | ClK | AgL |
|-------------|-------|------|------|-------|-------|
| Silver5.spc | 63.96 | 0.85 | 3.25 | 15.42 | 16.52 |

Figure 9-B

ESR (Electron spin resonance) spectrometer analysis of silver silicate (synthesized at neutral (pH 6-7) reaction conditions).

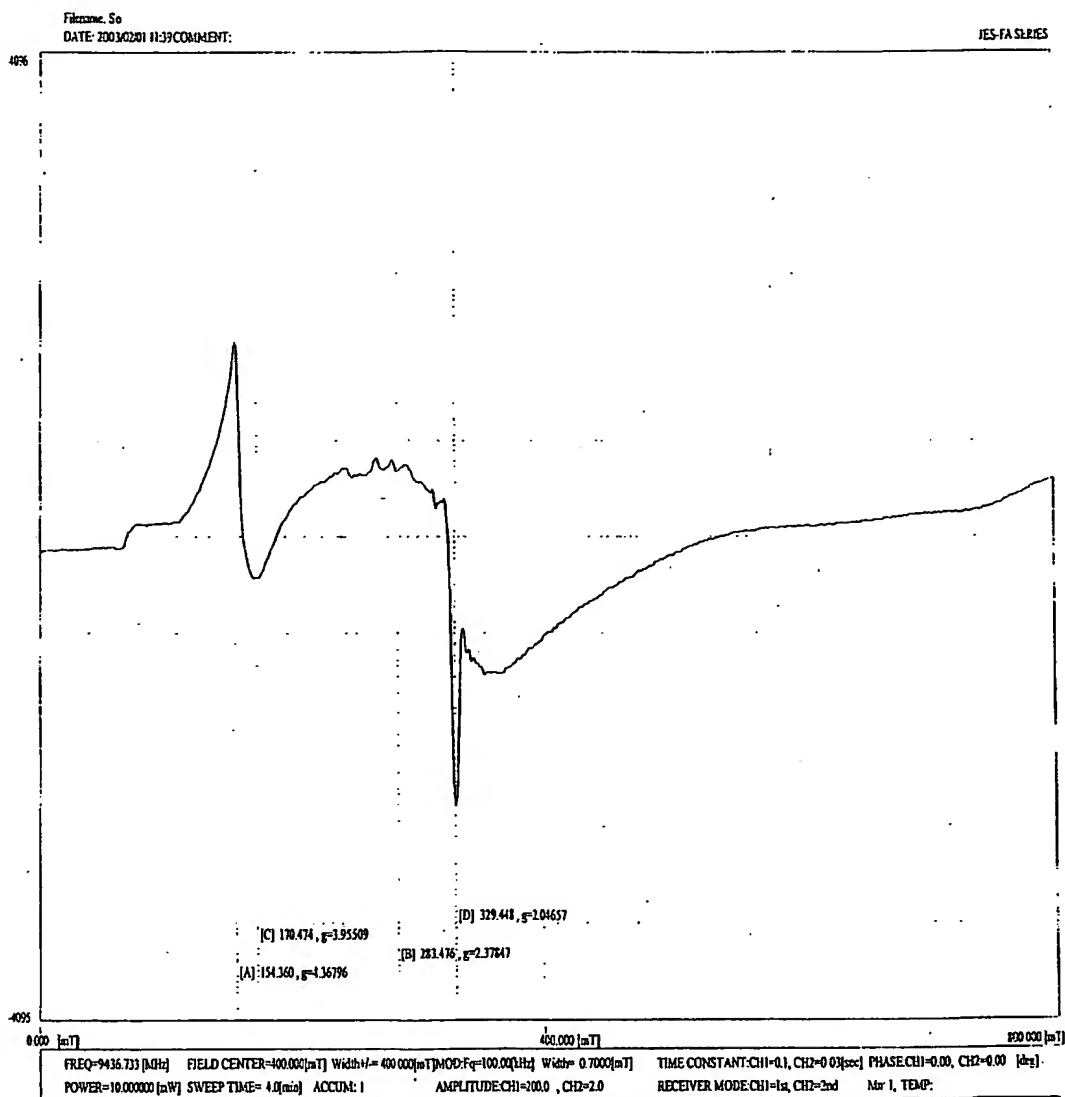
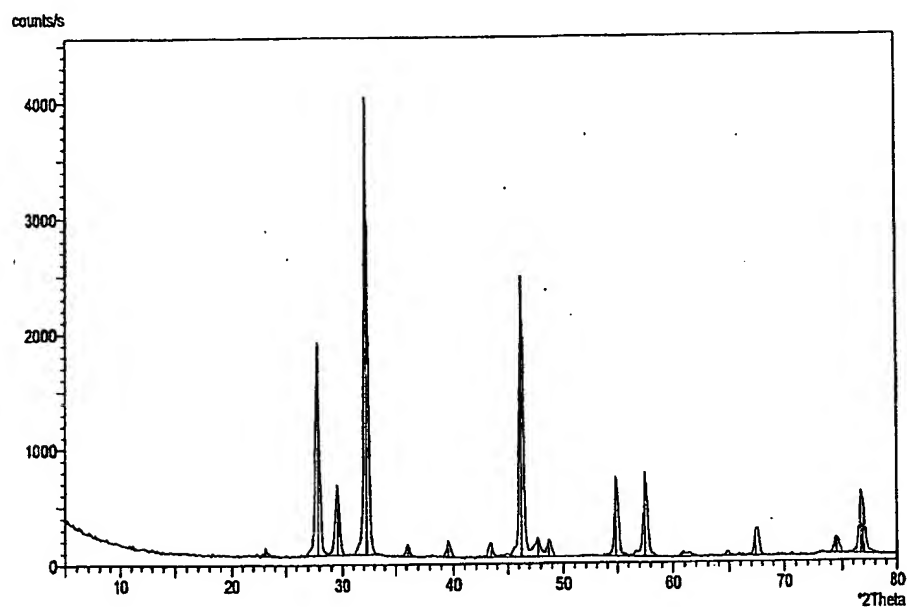


Figure 9-C

XRD (X-ray diffraction) pattern of silver silicate (synthesized at neutral (pH 6-7) reaction conditions).

XPert Graphics & Identify
Graph: So-r

User-1
2/3/03 11:52



Philips Analytical

XRD (X-ray diffraction) pattern of silver silicate (synthesized at neutral (pH 6-7) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: So-r 2

User-1
2/3/03 11:52

Original scan: So-r
Description of scan:

Date: 2/3/03 11:12

Used wavelength: K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio : 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set: As Measured Intensities
Set created: 1/8/03 13:03
Peak positions defined by: Minimum of 2nd derivative
Minimum peak tip width (°2Theta): 0.00
Minimum peak tip width (°2Theta): 1.00
Peak base width (°2Theta): 2.00
Minimum significance: 0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 12.51901 | 0.61 | 7.05514 | 24.25 | 269.08 | 0.32000 | 0.75 |
| 3.84145 | 1.61 | 23.13452 | 63.48 | 84.62 | 0.24000 | 0.85 |
| 3.19616 | 46.53 | 27.89129 | 1835.66 | 84.32 | 0.32000 | 11.62 |
| 3.02038 | 15.33 | 29.55040 | 604.98 | 86.85 | 0.40000 | 10.85 |
| 2.76936 | 100.00 | 32.29885 | 3945.11 | 91.02 | 0.36000 | 24.39 |
| 2.48336 | 2.75 | 36.13978 | 108.38 | 69.78 | 0.20000 | 1.06 |
| 2.27608 | 3.61 | 39.56180 | 142.47 | 63.39 | 0.24000 | 1.46 |
| 2.08218 | 3.16 | 43.42372 | 124.78 | 58.90 | 0.44000 | 4.34 |
| 1.96033 | 61.37 | 46.27446 | 2421.27 | 59.81 | 0.44000 | 31.71 |
| 1.90300 | 4.13 | 47.75348 | 162.86 | 60.29 | 0.20000 | 0.87 |
| 1.86696 | 3.87 | 48.73456 | 152.60 | 60.60 | 0.28000 | 2.05 |
| 1.67244 | 17.12 | 54.84804 | 675.21 | 58.99 | 0.40000 | 11.19 |
| 1.60159 | 18.06 | 57.49439 | 712.55 | 55.15 | 0.20000 | 2.33 |
| 1.52203 | 0.97 | 60.80730 | 38.34 | 49.06 | 0.32000 | 0.61 |
| 1.43528 | 1.08 | 64.91550 | 42.68 | 50.99 | 0.28000 | 1.03 |
| 1.38831 | 5.42 | 67.39817 | 213.70 | 52.15 | 0.24000 | 1.32 |
| 1.27274 | 3.54 | 74.48880 | 139.61 | 66.51 | 0.48000 | 3.96 |
| 1.24157 | 13.09 | 76.69181 | 516.25 | 62.23 | 0.24000 | 2.43 |
| 1.23836 | 11.31 | 76.92707 | 446.10 | 61.78 | 0.16000 | 0.61 |

WO 2004/101435

Figure 10-A:

App No.: NEW

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)
NEW SHEET

Docket No.: 2761-0173PUS1

B2003/002011

Sheet 38 of 56

Composition analysis of silver silicate (synthesized at acidic (pH 2) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

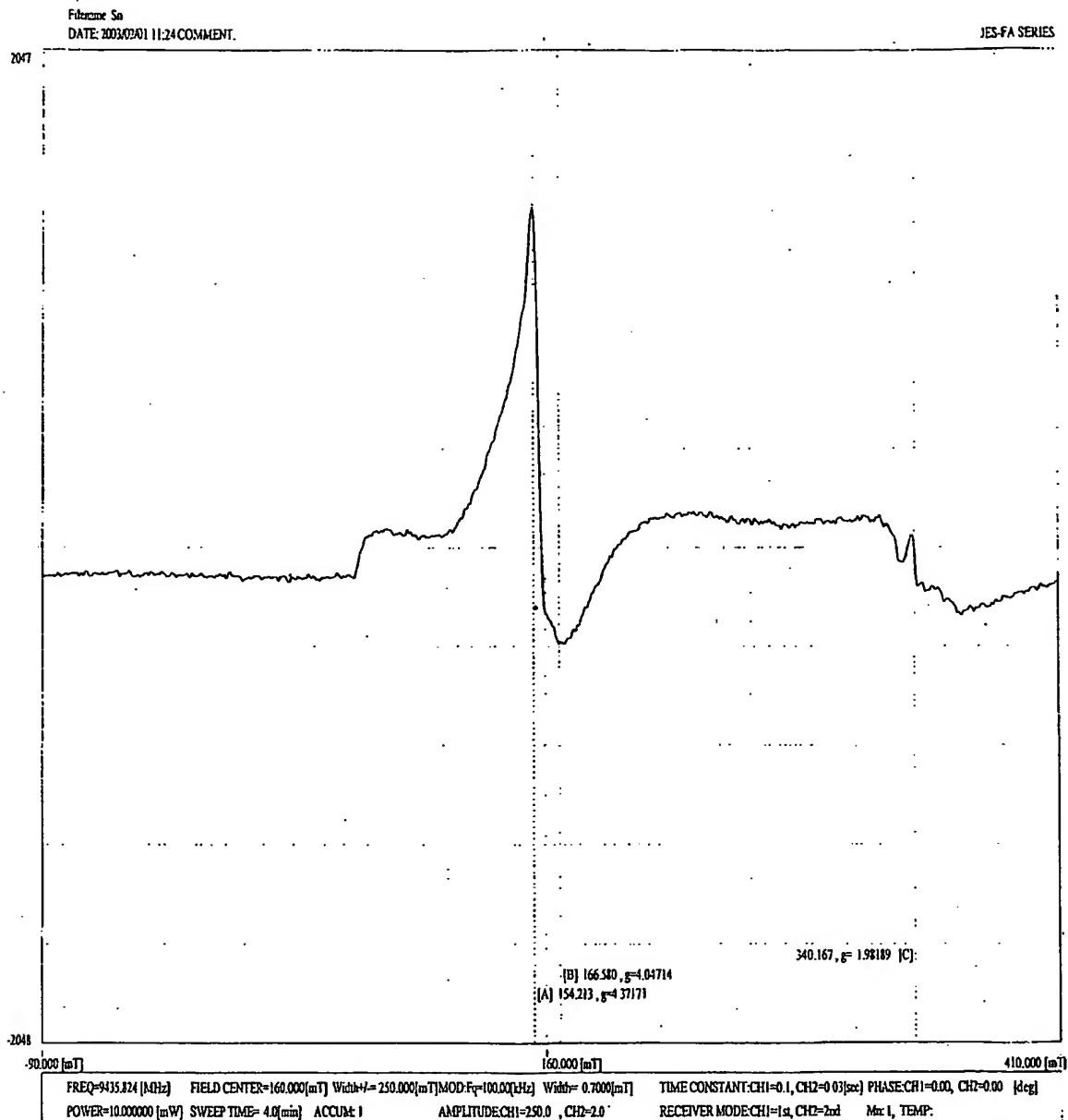
Weight % by Element

| FileNames | o k | NaK | Sik | ClK | AgL |
|--------------|-------|------|-------|------|-------|
| Silver-4.spc | 52.01 | 4.83 | 20.85 | 0.46 | 21.86 |

Atomic % by Element

| FileNames | o k | NaK | Sik | ClK | AgL |
|--------------|-------|------|-------|------|------|
| Silver-4.spc | 73.57 | 4.75 | 16.80 | 0.29 | 4.59 |

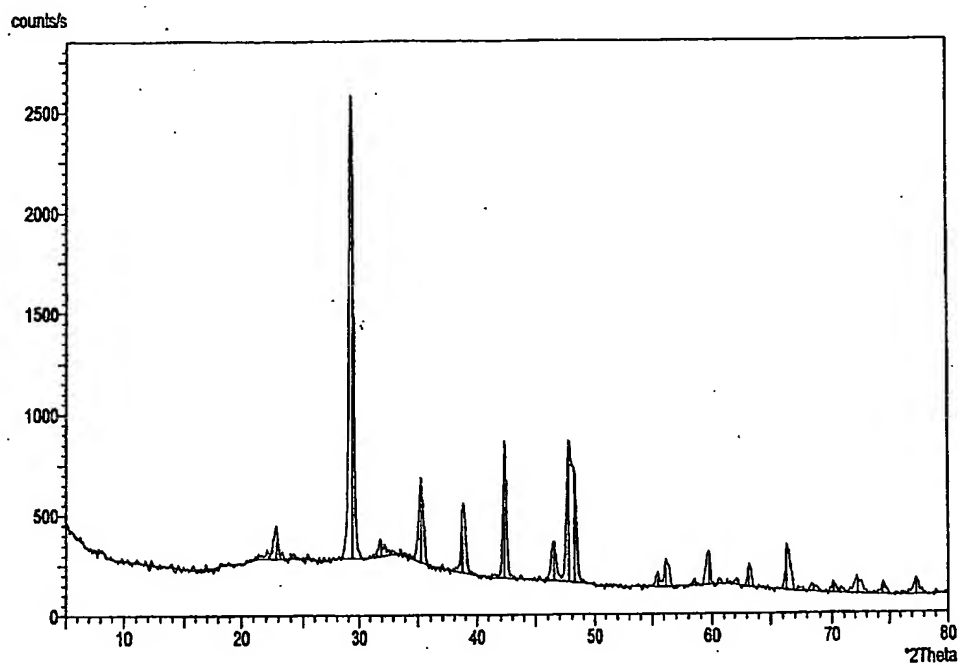
ESR (Electron spin resonance) spectrometer analysis of silver silicate (synthesized at acidic (pH 2) reaction conditions).



XRD (X-ray diffraction) pattern of silver silicate (synthesized at acidic (pH 2) reaction conditions).

X'Pert Graphics & Identify
Graph: Sn-r

User-1
23/03 12:41



Philips Analytical

XRD (X-ray diffraction) pattern of silver silicate (synthesized at acidic (pH 2) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: Sn-r 2

User-1
2/3/03 12:41

Original scan: Sn-r
Description of scan:

Date: 2/3/03 12:12

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio: 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 3.89288 | 7.31 | 22.82476 | 162.05 | 285.57 | 0.20000 | 0.84 |
| 3.04209 | 100.00 | 29.33483 | 2217.87 | 286.93 | 0.44000 | 27.45 |
| 2.80105 | 2.99 | 31.92363 | 66.30 | 297.07 | 0.64000 | 0.85 |
| 2.54412 | 18.81 | 35.24794 | 417.13 | 264.05 | 0.24000 | 2.56 |
| 2.32266 | 15.21 | 38.73633 | 337.42 | 211.76 | 0.32000 | 3.87 |
| 2.13433 | 30.40 | 42.31091 | 674.27 | 184.90 | 0.24000 | 5.12 |
| 1.95266 | 8.89 | 46.46684 | 197.27 | 168.22 | 0.36000 | 3.23 |
| 1.90573 | 30.86 | 47.68093 | 684.55 | 162.50 | 0.24000 | 2.62 |
| 1.88838 | 24.63 | 48.14670 | 546.21 | 160.31 | 0.32000 | 2.62 |
| 1.65610 | 3.33 | 55.43541 | 73.96 | 136.14 | 0.24000 | 0.81 |
| 1.63624 | 6.25 | 56.16747 | 138.52 | 134.86 | 0.20000 | 0.81 |
| 1.54698 | 7.23 | 59.72562 | 160.38 | 146.27 | 0.28000 | 2.15 |
| 1.47111 | 4.99 | 63.14884 | 110.71 | 134.86 | 0.32000 | 2.37 |
| 1.40804 | 10.18 | 66.33090 | 225.85 | 116.60 | 0.32000 | 3.21 |
| 1.36874 | 1.37 | 68.49464 | 30.40 | 107.27 | 0.48000 | 0.82 |
| 1.34028 | 2.30 | 70.15949 | 50.94 | 101.71 | 0.40000 | 1.02 |
| 1.30705 | 3.20 | 72.21879 | 71.02 | 97.84 | 0.64000 | 1.37 |
| 1.27367 | 2.54 | 74.42506 | 56.25 | 93.68 | 0.24000 | 0.67 |
| 1.23314 | 3.73 | 77.31282 | 82.74 | 91.67 | 0.40000 | 2.27 |

WO 2004/101435

Figure 11-A:

App No.: NEW

Inventor: Yandapalli Durga PRASAD

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Docket No.: 2761-0173PUS1

Sheet 42 of 56

B2003/002011

Composition analysis of manganese silicate (synthesized at neutral (pH 6-7) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

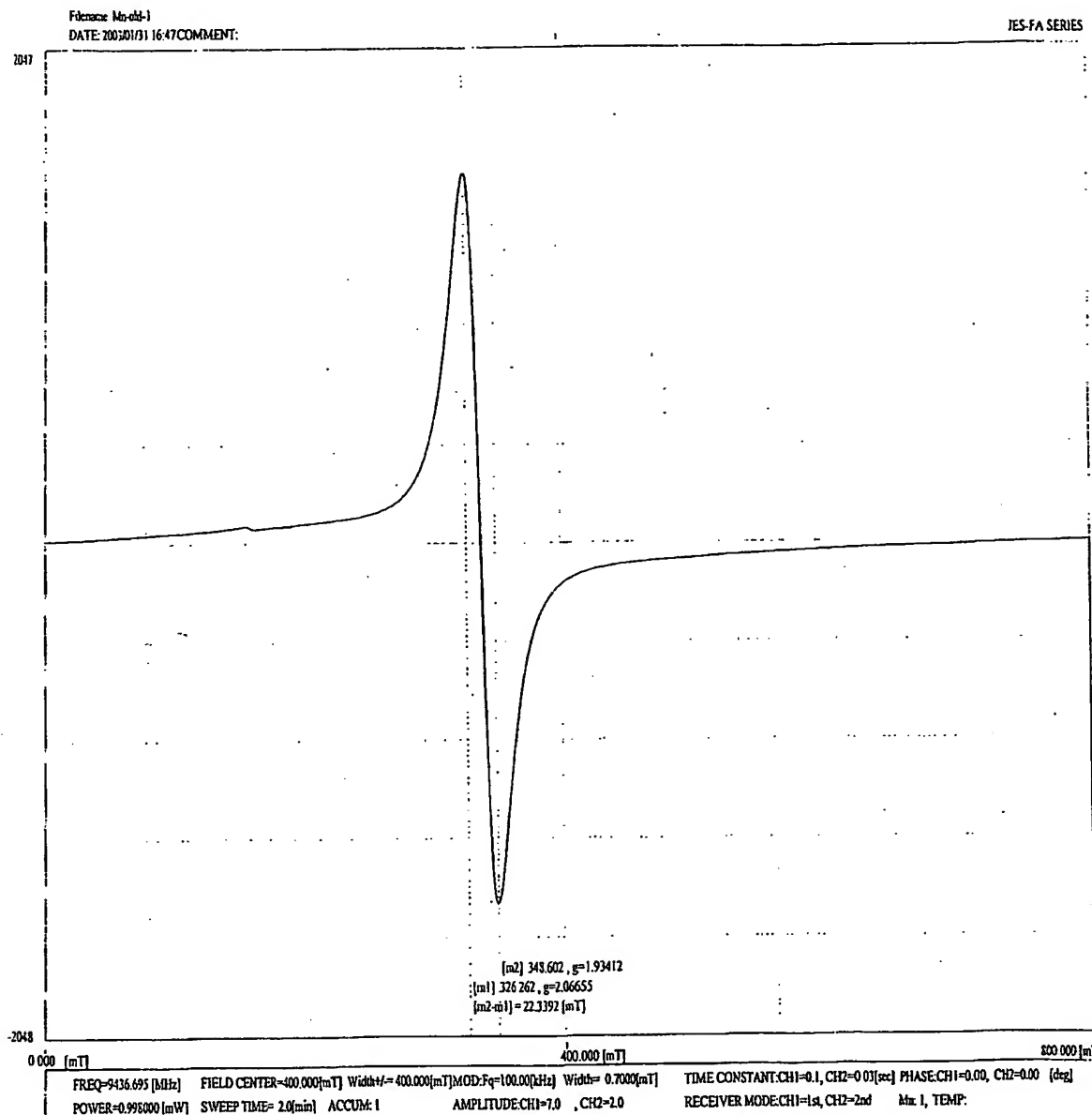
Weight % by Element

| FileNames | o k | NaK | Sik | ClK | MnK |
|-------------|--------|------|-------|------|-------|
| Manganese-o | 142.30 | 1.03 | 19.11 | 0.43 | 37.14 |

Atomic % by Element

| FileNames | o k | NaK | Sik | ClK | MnK |
|-------------|--------|------|-------|------|-------|
| Manganese-o | 165.17 | 1.10 | 16.77 | 0.30 | 16.66 |

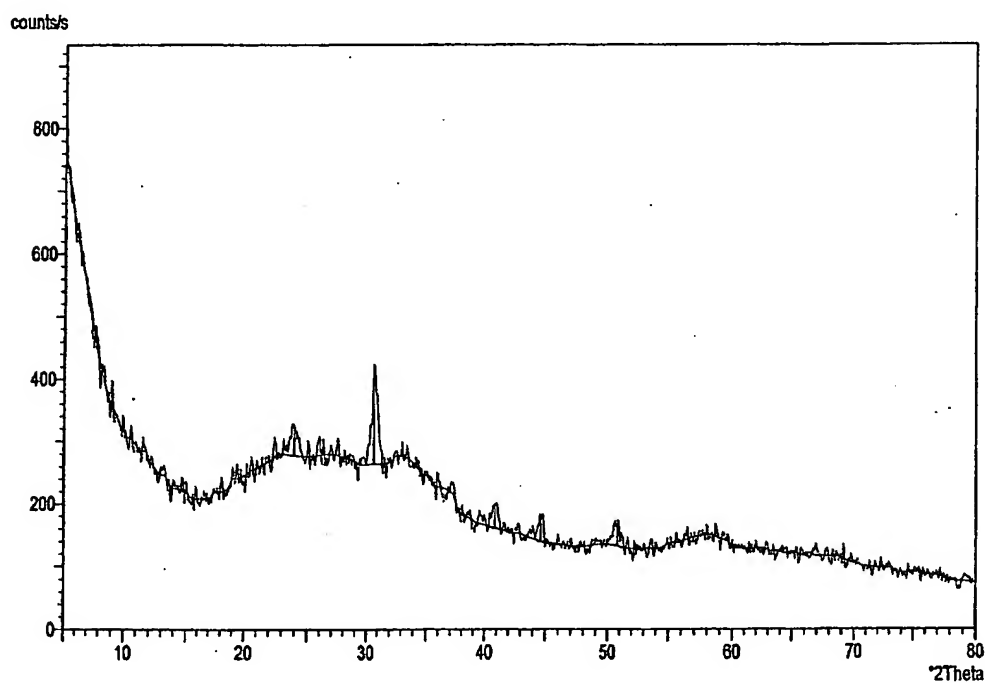
ESR (Electron spin resonance) spectrometer analysis of manganese silicate (synthesized at neutral (pH 6-7) reaction conditions).



XRD (X-ray diffraction) pattern of manganese silicate (synthesized at neutral (pH 6-7) reaction conditions).

X'Pert Graphics & Identify
Graph: MO-R

User-1
2/3/03 11:49



Philips Analytical

XRD (X-ray diffraction) pattern of manganese silicate (synthesized at neutral (pH 6-7) reaction conditions).

X'Pert Graphics & Identify
 (searched) peak list: MO-R 2

User-1
 2/3/03 11:50

Original scan: MO-R
 Description of scan:

Date: 2/2/03 16:35

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å):
 K-Alpha2 wavelength (Å):
 K-Alpha2/K-Alpha1 intensity ratio :
 K-Alpha wavelength (Å):
 K-Beta wavelength (Å):

1.54056
 1.54439
 0.50000
 1.54056
 1.39222

Peak search parameter set:

As Measured Intensities

Set created:
 Peak positions defined by:
 Minimum peak tip width (°2Theta):
 Minimum peak tip width (°2Theta):
 Peak base width (°2Theta):
 Minimum significance:

1/8/03 13:03
 Minimum of 2nd derivative
 0.00
 1.00
 2.00
 0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 3.70419 | 29.83 | 24.00430 | 44.16 | 278.06 | 0.64000 | 0.71 |
| 2.91440 | 100.00 | 30.65087 | 148.04 | 264.37 | 0.20000 | 0.63 |
| 2.20663 | 25.19 | 40.86153 | 37.29 | 162.18 | 0.48000 | 0.69 |
| 2.02880 | 29.18 | 44.62686 | 43.19 | 140.28 | 0.48000 | 0.68 |
| 1.79758 | 23.71 | 50.74610 | 35.10 | 133.23 | 0.48000 | 0.61 |

WO 2004/101435

App No.: NEW

Docket No.: 2761-0173PUS1

Inventor: Yandapalli Durga PRASAD

B2003/002011

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Sheet 46 of 56

Figure 12-A:

Composition analysis of manganese silicate (synthesized at extreme acidic (below pH 2) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

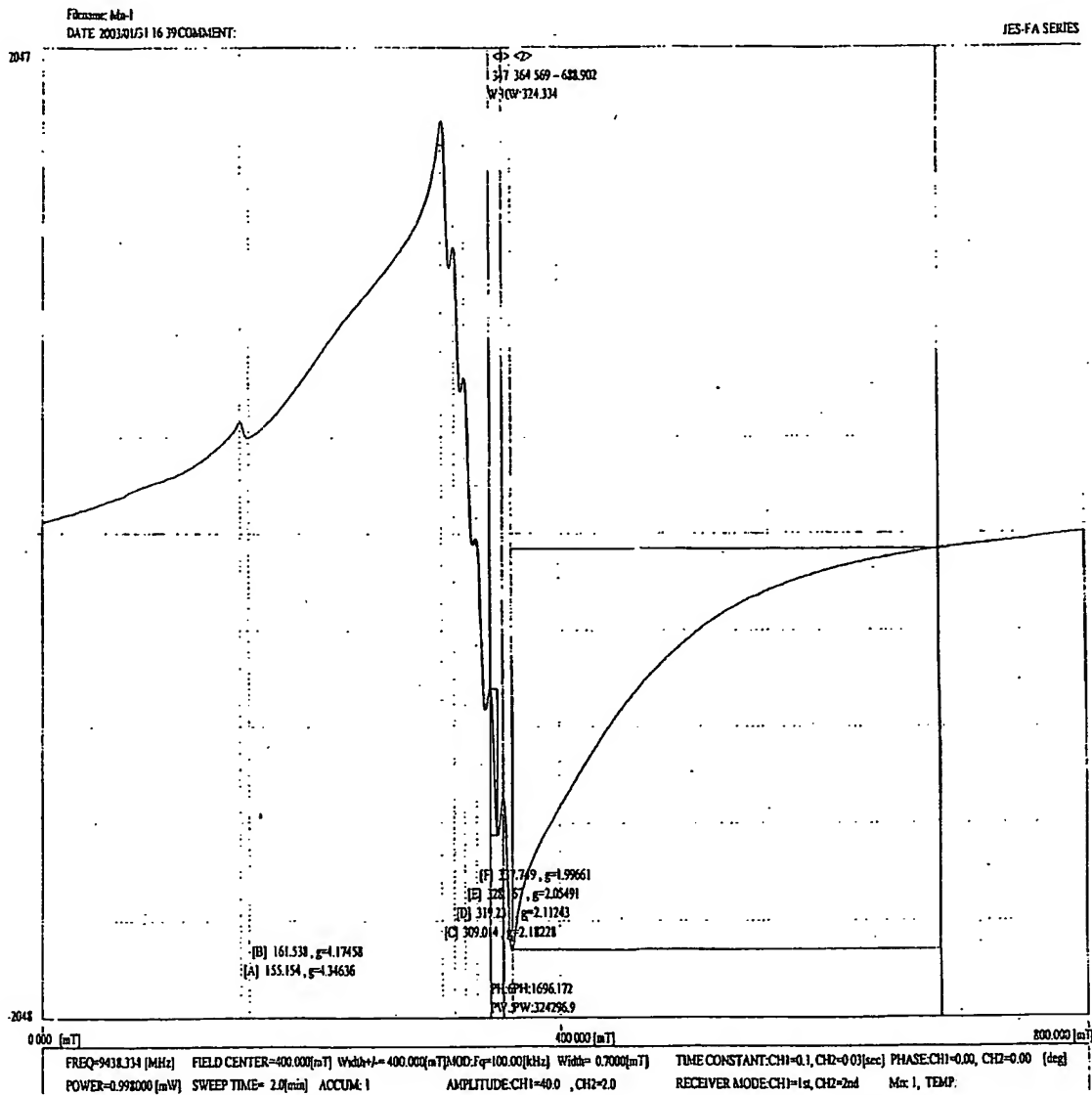
Weight % by Element

| FileNames | o k | NaK | Sik | ClK | MnK |
|--------------|-------|------|-------|------|-------|
| manganese-ne | 34.04 | 0.82 | 30.75 | 0.75 | 33.64 |

Atomic % by Element

| FileNames | o k | NaK | Sik | ClK | MnK |
|--------------|-------|------|-------|------|-------|
| manganese-ne | 54.67 | 0.92 | 28.13 | 0.54 | 15.73 |

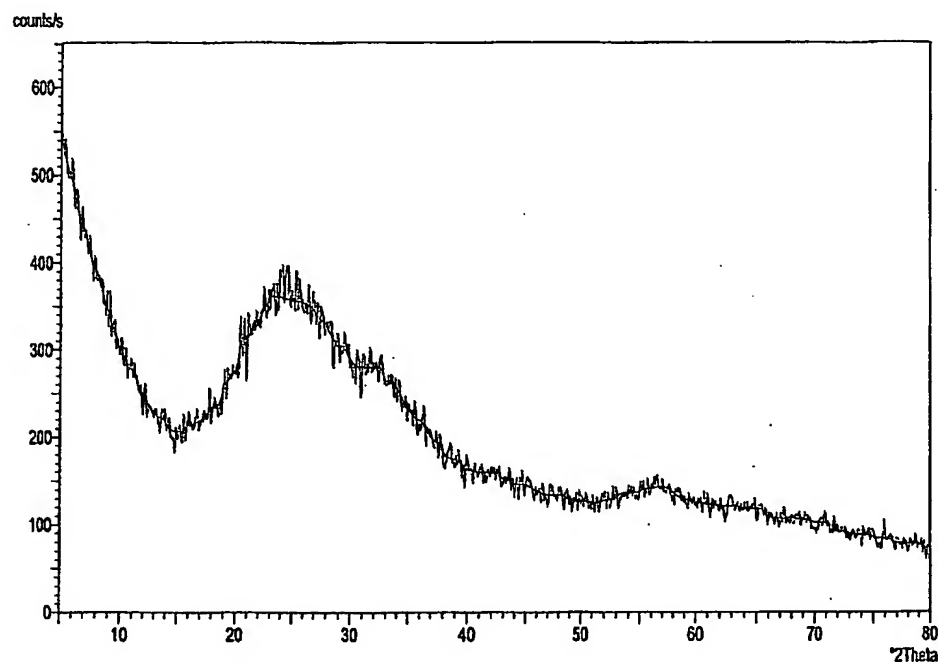
ESR (Electron spin resonance) spectrometer analysis of manganese silicate (synthesized at extreme acidic (below pH 2) reaction conditions).



XRD (X-ray diffraction) pattern of manganese silicate (synthesized at extreme acidic (below pH 2) reaction conditions).

XPert Graphics & Identify
Graph: MN-R

User-1
2/3/03 11:50



Philips Analytical

XRD (X-ray diffraction) pattern of manganese silicate (synthesized at extreme acidic (below pH 2) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: MN-R 2

User-1
2/3/03 11:51

Original scan: MN-R
Description of scan:

Date: 2/2/03 17:01

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio: 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set:

As Measured Intensities

Set created:

1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta):

0.00

Minimum peak tip width (°2Theta):

1.00

Peak base width (°2Theta):

2.00

Minimum significance:

0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 3.60774 | 100.00 | 24.65399 | 32.88 | 359.03 | 0.96000 | 0.77 |

Figure 13-A:

Composition analysis of zirconium silicate (synthesized at neutral (pH 6-7) reaction conditions) using EDAX attached to SEM (Scanning Electron Microscope).

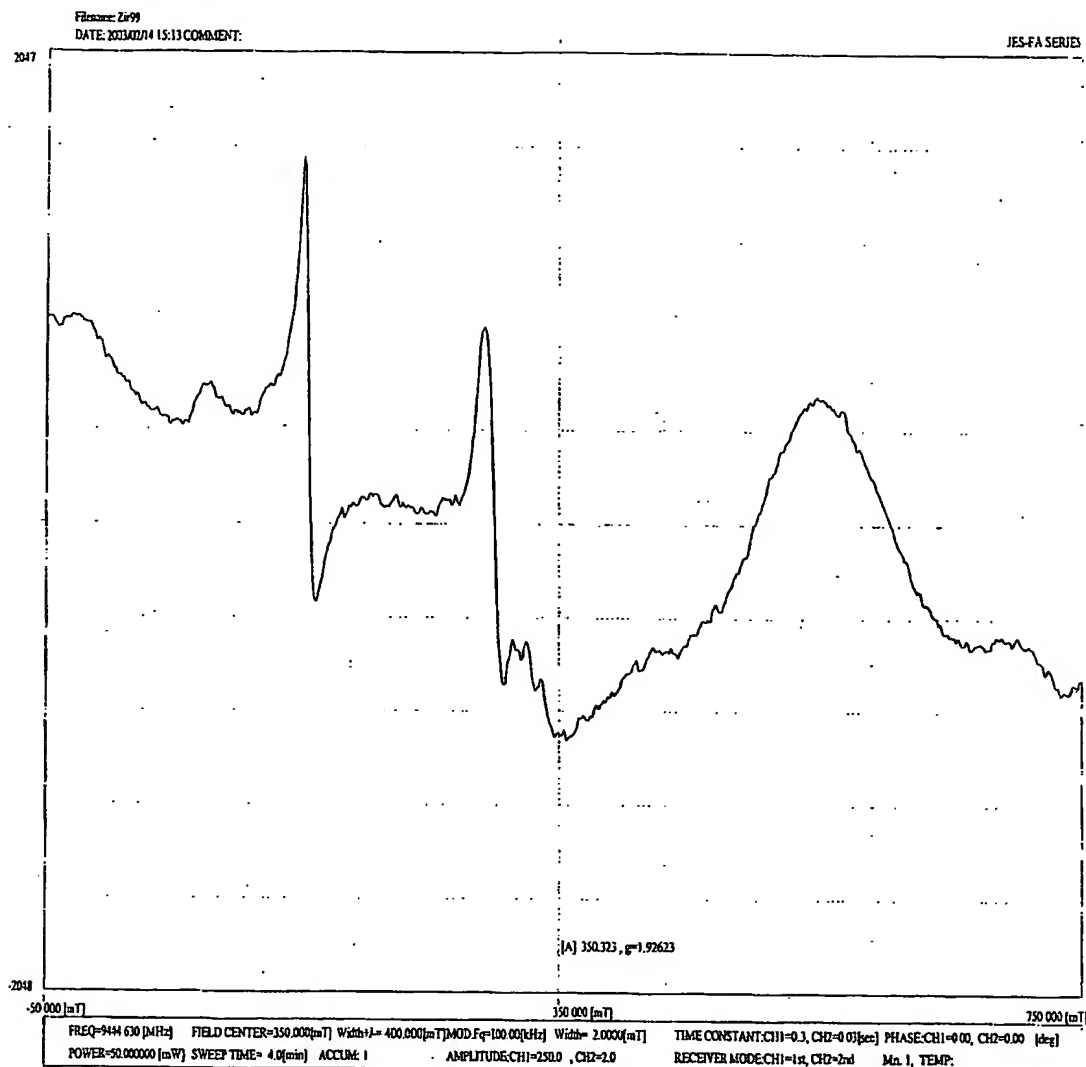
Weight % by Element

| FileNames | o k | Sik | ZrL |
|--------------|-------|-------|-------|
| Zircon99.spc | 39.00 | 14.78 | 46.22 |

Atomic % by Element

| FileNames | o k | Sik | ZrL |
|--------------|-------|-------|-------|
| Zircon99.spc | 70.23 | 15.17 | 14.60 |

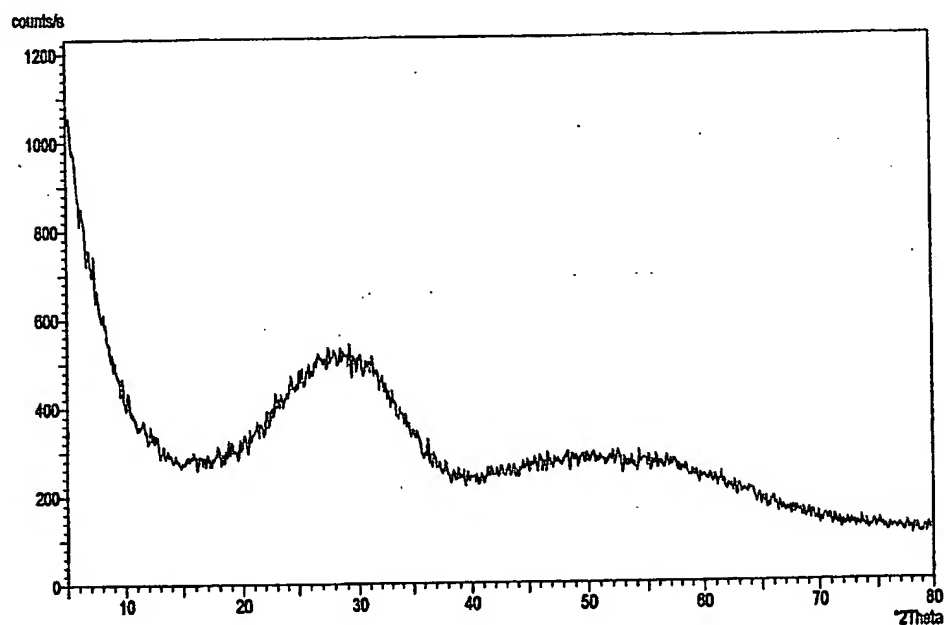
ESR (Electron spin resonance) spectrometer analysis of zirconium silicate (synthesized at neutral (pH 6-7) reaction conditions).



XRD (X-ray diffraction) pattern of zirconium silicate (synthesized at neutral (pH 6-7) reaction conditions).

X'Pert Graphics & Identify
Graph: 09

User-1
2/22/03 13:13



Philips Analytical

WO 2004/101435

App No.: NEW

Docket No.: 2761-0173PUS1

Inventor: Yandapalli Durga PRASAD

2003/002011

Title: FUNCTIONAL TRANSITION METAL SILICATES (FTMS)

NEW SHEET

Sheet 53 of 56

Figure 14-A:

Composition analysis of zirconium silicate (synthesized at extreme acidic (below pH 2) reaction conditions using EDAX attached to SEM (Scanning Electron Microscope)).

Weight % by Element

| FileNames | o k | NaK | Sik | ZrL | ClK |
|--------------|-------|------|-------|-------|------|
| Zircon55.spc | 51.43 | 0.95 | 26.86 | 20.76 | 0.00 |

Atomic % by Element

| FileNames | o k | NaK | Sik | ZrL | ClK |
|--------------|-------|------|-------|------|------|
| Zircon55.spc | 72.40 | 0.93 | 21.54 | 5.13 | 0.00 |

Figure 14-B

ESR (Electron spin resonance) spectrometer analysis of zirconium silicate (synthesized at extreme acidic (below pH 2) reaction conditions).

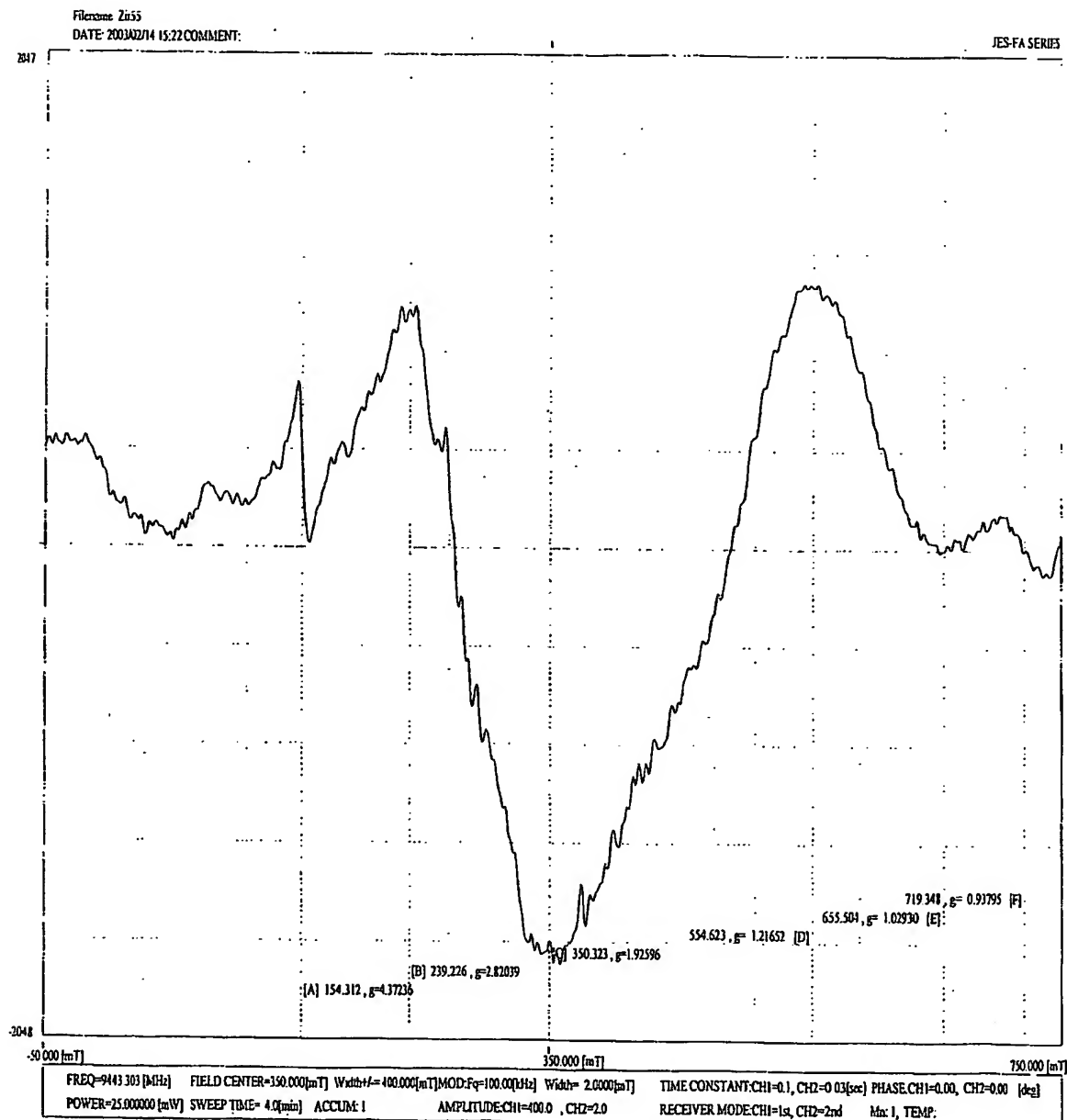
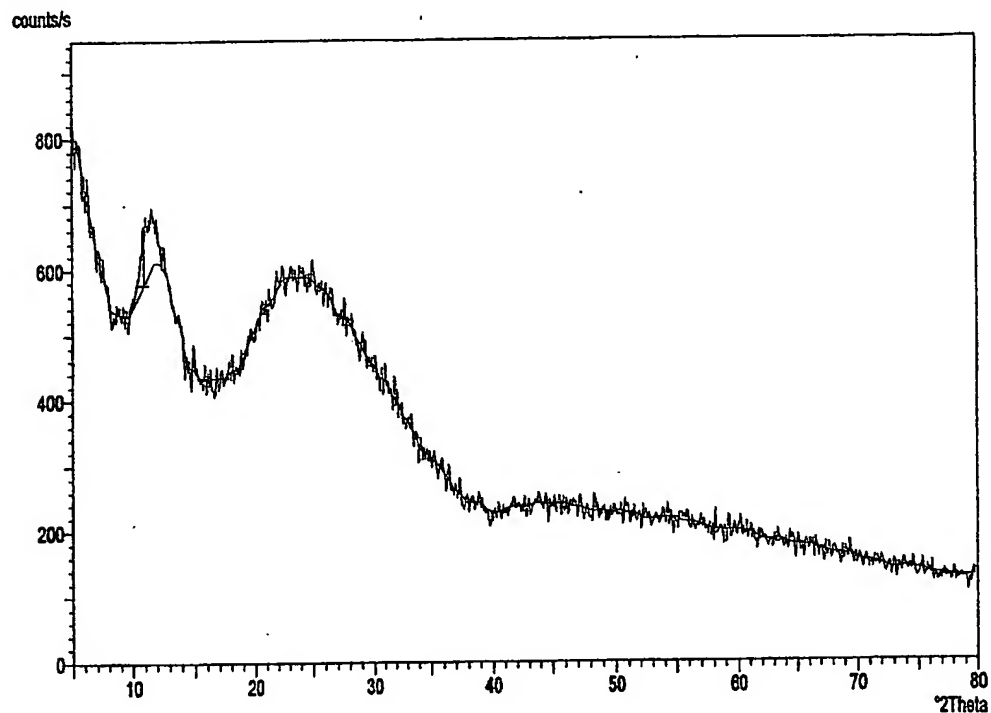


Figure 14-C

XRD (X-ray diffraction) pattern of zirconium silicate (synthesized at extreme acidic (below pH 2) reaction conditions).

XPert Graphics & Identify
Graph: 55

User-1
2/22/03 13:12



Philips Analytical

Figure 14-C

XRD (X-ray diffraction) pattern of zirconium silicate (synthesized at extreme acidic (below pH 2) reaction conditions).

X'Pert Graphics & Identify
(searched) peak list: 55 2

User-1
2/22/03 13:12

Original scan: 55
Description of scan:

Date: 2/22/03 11:31

Used wavelength:

K-Alpha1

K-Alpha1 wavelength (Å): 1.54056
K-Alpha2 wavelength (Å): 1.54439
K-Alpha2/K-Alpha1 intensity ratio: 0.50000
K-Alpha wavelength (Å): 1.54056
K-Beta wavelength (Å): 1.39222

Peak search parameter set:
Set created:

As Measured Intensities
1/8/03 13:03

Peak positions defined by:

Minimum of 2nd derivative

Minimum peak tip width (°2Theta): 0.00
Minimum peak tip width (°2Theta): 1.00
Peak base width (°2Theta): 2.00
Minimum significance: 0.60

| d-spacing (Å) | Relative Intensity (%) | Angle (°2Theta) | Peak Height (counts/s) | Background (counts/s) | Tip Width (°2Theta) | Significance |
|------------------|------------------------------|--------------------|------------------------------|--------------------------|---------------------------|--------------|
| 8.11438 | 100.00 | 10.89433 | 84.80 | 578.00 | 0.80000 | 0.69 |

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.